Montana Fish, Wildlife & Parks

1400 South 19th Avenue
Bozeman, MT 59718

April 29, 2016

To: Governor's Office, Tim Baker, State Capitol, Room 204, P.O. Box 200801, Helena, MT 59620-0801
Environmental Quality Council, State Capitol, Room 106, P.O. Box 201704, Helena, MT 59620-1704
Dept. of Environmental Quality, Metcalf Building, P.O. Box 200901, Helena, MT 59620-0901
Dept. of Natural Resources & Conservation, P.O. Box 201601, Helena, MT 59620-1601
Montana Fish, Wildlife & Parks:

Director's Office	Parks Division	Lands Section	FWP Commissioners
Fisheries Division	Legal Unit	Wildlife Division	Design & Construction

MT Historical Society, State Historic Preservation Office, P.O. Box 201202, Helena, MT 59620-1202
MT State Parks Association, P.O. Box 699, Billings, MT 59103
MT State Library, 1515 E. Sixth Ave., P.O. Box 201800, Helena, MT 59620
James Jensen, Montana Environmental Information Center, P.O. Box 1184, Helena, MT 59624
Janet Ellis, Montana Audubon Council, P.O. Box 595, Helena, MT 59624
George Ochenski, P.O. Box 689, Helena, MT 59624
Jerry DiMarco, P.O. Box 1571, Bozeman, MT 59771
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Jack Jones, 3014 Irene St., Butte, MT 59701
Jack Atcheson, 2309 Hancock Avenue, Butte MT 59701
U.S. Army Corp of Engineers, Helena
U.S. Fish and Wildlife Service, Helena
U.S. Fish and Wildlife Service, 420 Barrett Street, Dillon, MT 59725
Big Hole Watershed Committee, P.O. Box 931, Butte, MT 59703
Montana Trout Unlimited, P.O. Box 7186, Missoula, MT 59807
Dan Vermillion, FWP Commissioner, Livingston MT
Earnest and Colleen Bacon, 2215 Fishtrap Creek Road, Wisdom, MT 59761
Dept. of Natural Resources and Conservation, 730 N. Montana Street, Dillon, MT 59725-9424
George Grant Chapter of Trout Unlimited, P.O. Box 563, Butte, MT 59703
Skyline Sportsmen, P.O. Box 173, Butte, MT 59703
Anaconda Sportsmen, 2 Cherry, Anaconda, MT 59711
E.T. Bud Moran, Chairman CSKT, PO Box 278, Pablo, MT 59855
Al Lubeck, 2710 Amherst, Ave, Butte, MT 59701
Adam Rissien, ORV Coordinator, Wildands CPR, PO Box 7516, Missoula, MT 59807
Josiah Pinkham, Tribal Arch., Nez Perce Tribe, PO Box 365, Lapwai, ID 83540

Ladies and Gentlemen:

Montana Fish, Wildlife & Parks (FWP) is proposing a multifaceted project on the French Creek Watershed near Anaconda, MT. The proposed action would restore habitat and native aquatic species to the French Creek watershed in the Big Hole River drainage. The habitat restoration component of the project would consist of reclaiming areas in the upper watershed impacted by atmospheric deposition of harmful substances from the Anaconda Smelter. This restoration work would focus on establishing vegetation on unvegetated slopes of Sugarloaf Mountain and the creation of sediment retaining structures to reduce copper and arsenic laden sediments from reaching California Creek. Habitat would also be restored in placer mined reaches of French Creek, French Gulch and Moose Creek. The goal of this restoration would be to restore stream function, a floodplain and fish passage in mined reaches of the streams. Pasture fences would be relocated to reduce livestock impacts to the riparian area and stream channel. Native fish species restoration is also being proposed as part of the overall watershed restoration. Native fish restoration would consist of the construction of a fish migration barrier on French Creek near the downstream boundary of the Mount Haggin Wildlife Management Area (WMA). This fish barrier would consist of an earthen dam with a concrete spillway that forms a small waterfall and precludes upstream fish passage. Upstream of the fish barrier there are more than 40 miles of stream that currently contain fish. Once the fish barrier is in place non-native trout (brook trout and rainbow trout) would be removed from the stream using the piscicide rotenone. Once non-native fish are removed, native westslope cutthroat trout (WCT) and Arctic grayling would be stocked into the stream.

This EA is available for review in Helena at FWP's Headquarters, the State Library, and the Environmental Quality Council. It also may be obtained from FWP at the address provided above, or viewed on FWP's internet website: http://www.fwp.mt.gov .

Montana Fish, Wildlife & Parks invites you to comment on the attached proposal. Public comment will be accepted until 31 May 2016 at 5:00 pm. Comments should be sent to the following:

Montana Fish, Wildlife & Parks
c/o French Creek Watershed EA
1820 Meadowlark Lane
Butte, MT 59701

Or e-mailed to: jimolsen@mt.gov

Sincerely,

Sam B. Sheppard
Region Three Supervisor

MONTANA FISH, WILDLIFE & PARKS
FISHERIES DIVISION

Environmental Assessment for Watershed Restoration in French Creek, Big Hole River Drainage

PART I: PROPOSED ACTION DESCRIPTION

A. Type of Proposed Action: The proposed action would restore habitat and native aquatic species to the French Creek watershed in the Big Hole River drainage. The habitat restoration component of the project would consist of reclaiming areas in the upper watershed impacted by atmospheric deposition of harmful substances from the Anaconda Smelter. This restoration work would focus on establishing vegetation on unvegetated slopes of Sugarloaf Mountain and the creation of sediment retaining structures to reduce copper and arsenic laden sediments from reaching California Creek. Habitat would also be restored in placer mined reaches of French Creek, French Gulch and Moose Creek. The goal of this restoration would be to restore stream function, a floodplain and fish passage in mined reaches of the streams. Pasture fences would be relocated to reduce livestock impacts to the riparian area and stream channel. Native fish species restoration is being proposed as part of the overall watershed restoration. Native fish restoration would consist of the construction of a fish migration barrier on French Creek near the downstream boundary of the Mount Haggin Wildlife Management Area (WMA). This fish barrier would consist of an earthen dam with a concrete spillway that forms a small waterfall and precludes upstream fish passage. Upstream of the fish barrier there are more than 40 miles of stream that currently contain fish. Once the fish barrier is in place non-native trout (brook trout and rainbow trout) would be removed from the stream using the piscicide rotenone in the formulation of CFT Legumine (5% rotenone). Once non-native fish are removed, native westslope cutthroat trout (WCT) and Arctic grayling would be stocked into the stream.

B. Agency Authority for the Proposed Action:

- FWP is required by law (§87-1-201(9)(a) Montana Code Annotated [MCA]) to implement programs that manage sensitive fish species in a manner that assists in the maintenance or recovery of those species, and that prevents the need to list the species under § 87-5-107 MCA or the federal Endangered Species Act. Section 87-1-201(9)(a), M.C.A.

  Numerous wildlife species of concern are found on Mount Haggin WMA. The following is a list of sensitive species that are known or assumed to exist within the WMA. Each species has a notation which tier it is ranked (1-5, with 1 being most in need of conservation) and whether it is a Species of Concern in Montana (SOC) or a federally listed Threatened or Endangered Species (T/E).

Common Name	Scientific Name	Tier Rank/SOC
Northern Goshawk	*Accipiter gentiles*	2, SOC
Black-backed Woodpecker	*Picoides articus*	1, SOC
Olive-sided Flycatcher	*Contopus cooperi*	1, SOC
Great Gray Owl	*Strix nebulosa*	2, SOC
Flammulated Owl	*Otus flammeolus*	1, SOC
Clark's Nutcracker	*Nucifraga Columbiana*	3, SOC
Fringed Myotis	*Myotis thysanodes*	2, SOC
Hoary Bat	*Lasiurus cinereus*	2, SOC
Wolverine	*Gulo gulo*	2, SOC
Canada Lynx	*Lynx Canadensis*	1, T/E
Fisher	*Martes pennanti*	2, SOC
Westslope Cutthroat Trout	*Oncorhynchus clarkii lewisi*	1, SOC
Western Pearlshell Mussel	*Margaritifera falcata*	2, SOC
Agapetus Caddisfly	*Agapetus Montanus*	3, SOC

- Mount Haggin Wildlife Management Area Interim Management Plan (1980)

  The interim management plan states that Mount Haggin WMA will be managed for dispersed outdoor recreation activities that are consistent with the area's ability to support such use without degradation of its natural resource values (wildlife, fisheries, vegetation, and cultural/historical resources). The plan describes activities that are aimed at protecting the basic soil, vegetation, and water resources of the WMA that will maintain or enhance wildlife and wildlife habitat.

- FWP is a signatory to the Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout in Montana (FWP 1999, 2007) which states: "The management goal for WCT in Montana is to ensure the long-term, self sustaining persistence of the subspecies within each of the five major river drainages they historically inhabited in Montana, and to maintain genetic diversity and life history strategies represented by the remaining local populations."

- According the FWP Statewide Fisheries Management Plan, the restoration goal for WCT east of the Continental Divide (Upper Missouri River Basin upstream from and including the Judith River) is to restore secure conservation populations of WCT to 20% of the historic distribution (FWP 2012). Populations of WCT are considered secure by FWP when they are isolated from non-native fishes, typically by a physical fish passage barrier, have a population size of at least 2,500 fish, and occupy sufficient (at least 5 to 6 miles) habitat to assure long-term persistence. Currently WCT (including slightly hybridized population > 90% WCT) occupy approximately 4% of their historic habitat. Also identified in the Fisheries Management Plan is that the primary focus for fisheries management in the upper Big Hole River drainage (from the headwaters to Dickie Bridge which includes French Creek) will be the conservation of native Arctic grayling.

- The draft Upper Missouri River Drainage Arctic Grayling Conservation and Management Plan states that Arctic grayling restoration efforts must include:
    1. Continued efforts to maintain, and as necessary, secure and enhance remaining aboriginal Arctic grayling populations
    2. Continued efforts to maintain, and as necessary, improve habitat conditions for extant and future Arctic grayling populations
    3. Establishing and maintaining genetic "replicates" of existing grayling populations.
    4. Seeking and implementing additional efforts to restore Arctic grayling to suitable habitats within their historic range
    5. Continued implementation of appropriate management actions based on research and identification of essential habitats
    6. Monitoring the status of aboriginal and introduced populations
    7. Continued evaluation of the nature and any effects of competition and predation between grayling and non-native trout

C. Estimated Commencement Date:

Action	Commencement Date	Completion Date
Atmospheric Deposition Restoration	5/1/16	11/1/20
Fish Barrier Construction	8/1/17	11/1/17
French Gulch Restoration	6/1/16	11/1/17
Moose Creek Restoration	6/1/16	11/1/17
French Creek Restoration	6/1/18	11/1/20
Native Fish Restoration	7/15/18	11/1/21

D. Name and Location of the Project**:** Watershed Restoration in French Creek, Big Hole River Drainage

French Creek is located in Deer Lodge County approximately 15 miles southeast of the town of Anaconda, Montana; T2N R12W Sec 1, 2, 3, 10, 11, 16, T3N R12W Sec 1, 12, 13, 24, 25, 36, T3N R11W Sec 15-22, 27-34, T2N R11W Sec 2-11, 14-16.

E. Project Size (acres affected)

1. Developed/residential – 0 acres
2. Industrial – 0 acres
3. Open space/Woodlands/Recreation – 0.4 acres when the French Creek road is relocated from the floodplain to the adjacent hillslope to the north. Nearly 2 miles of fencing will be erected to manage cattle grazing and reduce impacts to the riparian area. Approximately 116 acres of uplands in and around Sugarloaf Mountain at the headwaters of California Creek will be restored and revegetated. These restoration efforts include soil amendments such as lime, fertilizer, addition of organic material and plantings including live plantings and seeding. Sediment control devices would also be established

in gullies and erosion prone areas to slow the movement of sediment as the hillslopes become vegetated. Livestock and wildlife fence would be erected around California Creek at the mouths of gullies to encourage sediment -trapping vegetation to become established and act as a filter for sediment from the hillslopes.

4. Wetlands/Riparian – In French Gulch 1.12 acres of wetlands will be impacted by placer mining restoration. An additional 3.5 acres of wetlands will be created resulting in a net tripling of wetland acreage as a result of mining restoration. Approximately 8,400 ft of stream channel will be restored in French Gulch. In Moose Creek 0.40 acres of wetland will be impacted by placer mining restoration and 2.3 acres of wetlands will be created for a net gain of 1.9 acres. Approximately 610 ft of stream channel will be restored in Moose Creek. In French Creek 6.91 acres of wetlands will be impacted through restoration activities and 8.91 acres will be created for a net gain of 2 acres. In total, 5,706 ft of stream channel will be restored in French Creek. The native fish restoration project will impact approximately 40 miles of stream when rotenone is used to remove non-native fish, but there will be no physical disturbance to the channel for fish removal.
5. Floodplain – 3.5 acres of floodplain will be created in French Gulch, 2.3 acres in Moose Creek and 8.91 acres in French Creek.
6. Irrigated Cropland – 0 acres
7. Dry Cropland – 0 acres
8. Forestry – 0 acres
9. Rangeland – 0 acres

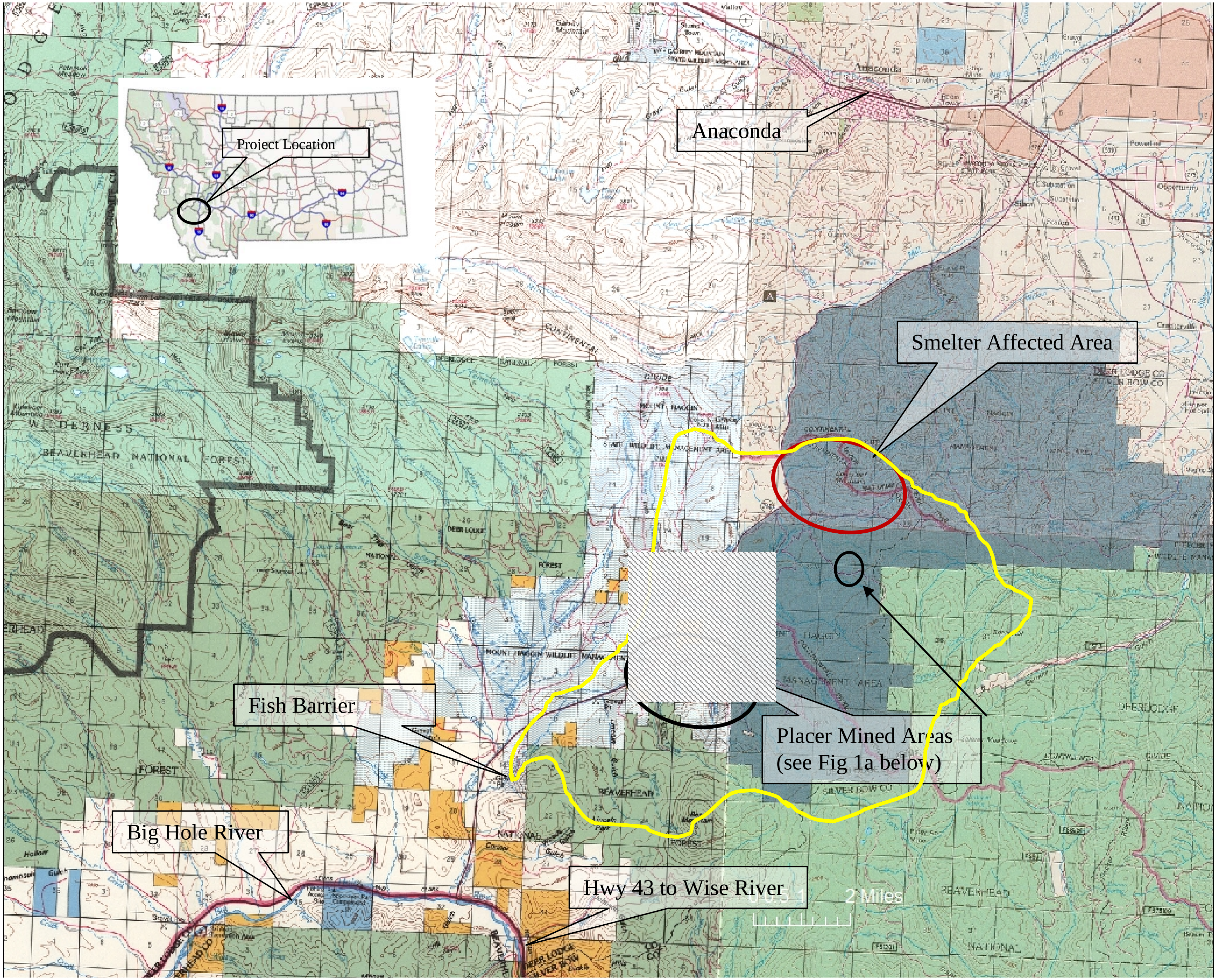

Figure 1. French Creek drainage (yellow outline) on the Mount Haggin Wildlife Management Area southwest of Anaconda, MT. Black circled areas are the placer mined reaches of streams (detailed in Fig 1a below). Red circled areas are the slopes impacted by the Anaconda Smelter.

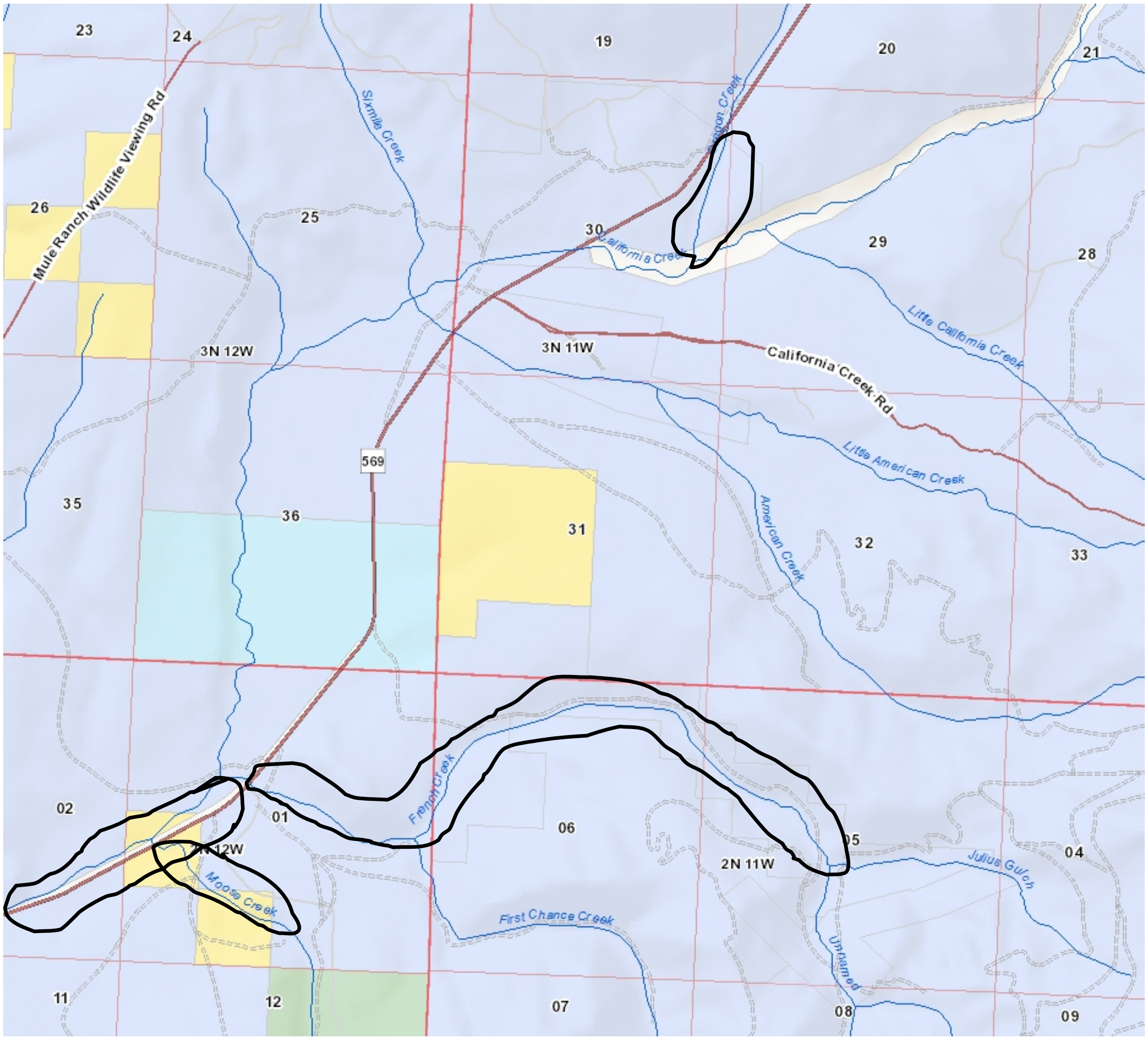

Figure 1a. Detail of placer mined reaches of French Creek and its tributaries proposed for restoration. Restoration areas are circled in black.

F. Narrative Summary of the Proposed Action and Purpose of the Proposed Action

1. Placer Mining

The Mount Haggin Wildlife Management Area (WMA, Figure 1) was acquired by Montana Fish, Wildlife and Parks (FWP) in 1976 from the Mount Haggin Livestock Company through the Nature Conservancy. Prior to state ownership the land was used for multiple purposes. Gold was first discovered 1864 in French Gulch and a sizable mining camp was established in that drainage with year-round occupants. The French Gulch area including First Chance Creek, Moose Creek, and parts of French Creek were mined on and off through the early 1900's. Two hard rock mines were also present at the headwaters of French Gulch at French Town. Additional areas were placer mined in the French Creek drainage including parts of California

Creek and Oregon Creek, but French Gulch was the most extensively mined area (Figure 2 and 3). In French Gulch, including First Chance Creek more than 6 miles of stream was mined from one side of the valley bottom to the other down to the bedrock (more than 30 ft down). Water was diverted from American, Moose and other streams to French Gulch to supply water and hydraulic power to equipment used to excavate gravels and extract gold. Large water cannons (known as Hydraulic Giants) were used to hydraulically blast away the adjacent hill slopes so that the removed material could be sluiced for gold. The spoils of these mining activities often ended up in the stream and floodplain. In the upper gulch a steam hoist or “Donkey” and derrick were employed raising and moving boulders out of the way. In 1900 the Allen Gold Mining Company added a floating dredge to French Creek which consisted of a boat or scow with appliances for digging and elevating material in front of it, sorting and washing it, collecting the gold and discharging the waste or tailing to the rear of the boat. Placer mining was more or less continuous, at varying scales and by various methods, from 1864 to 1911.

The legacy of placer mining on Mt. Haggin has left the stream channels in French Gulch, Moose Creek, French Creek, California Creek and Oregon Creek in poor condition. Mining has resulted in a straightened stream channel, the presence of large dredge spoils, increased stream gradient, reduced riparian area width and isolation of the stream from its floodplain (Figure 4). The straightened channel has resulted in poor fish habitat with few pools and poor quality spawning habitat. French Gulch and Moose Creek likely served as important spawning and rearing tributaries to French Creek prior to mining. Further, the straight channel and lack of a floodplain increases fine sediment erosion and transportation to French Creek downstream. In some reaches of the stream large gravel spoils cover the valley bottom replacing former riparian vegetation. These spoil piles are vegetated by upland species such as sage brush, juniper and lodgepole pine. The large spoil piles that flank the stream channel prevent the straightened channel from re-establishing meander bends. Mining has also resulted in the loss or restriction of fish passage in both French Gulch and Moose Creek.

To restore the impacts of past placer mining in French Gulch, Oregon Creek, Moose Creek, and French Creek an engineering firm was hired to develop a restoration design. This design prioritized the mining impacted areas based on the feasibility of restoration, the cost vs. benefits of restoration and the need to preserve the historic resources of the area. The goals of the restoration design are: 1) improve aquatic habitat, 2) improve and expand riparian habitat, 3) improve water quality, 4) improve quantity and quality of wetland features, and 5) provide fish passage.

Figure 2. French Gulch at the confluence of Julius Gulch in 1913. French Creek can be seen flowing through the mined area in the upper right of the photo.

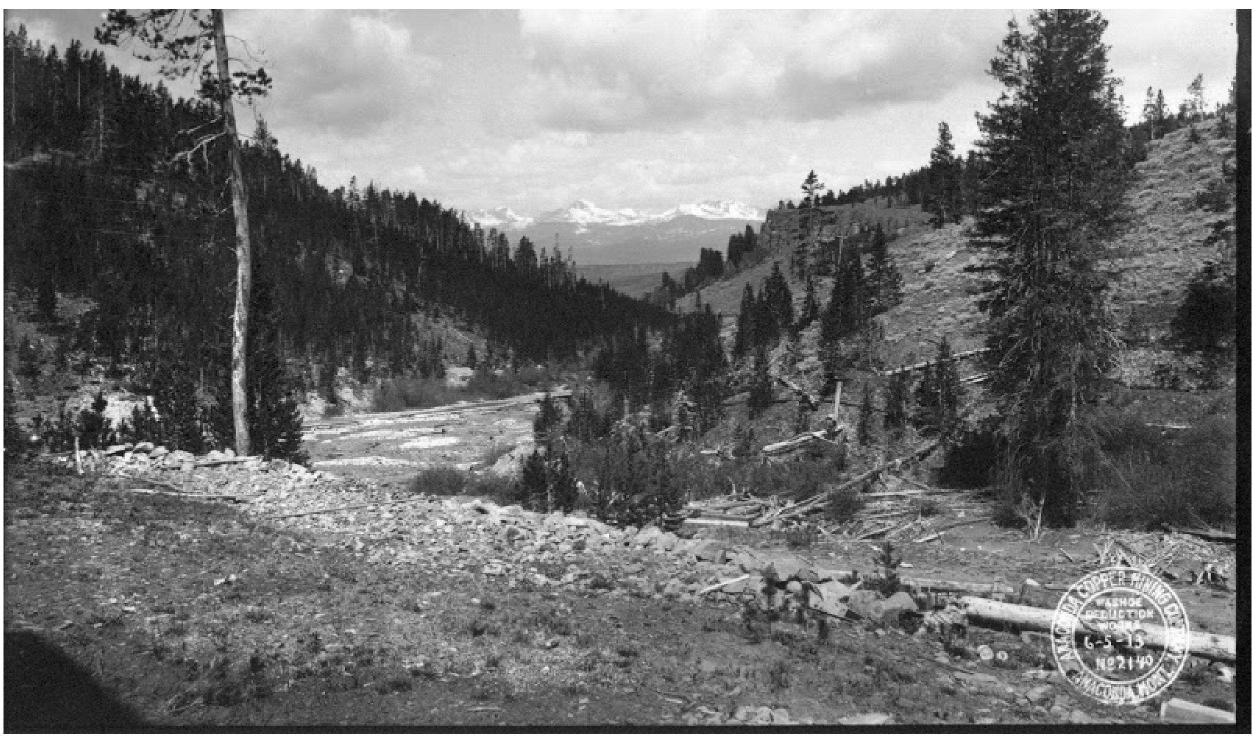

Figure 3. French Gulch downstream of Julius Gulch looking toward the Pintler Mountains in 1913. Notice the stream in the center-left has been mined from one side of the valley bottom to the other.

To improve aquatic habitat in mined reaches of streams, the primary objective will be to establish a more sinuous natural channel with appropriate riffle-pool sequences that match the geomorphic characteristics of the valley and reference conditions. The straightened and steep channel left by past mining has resulted in poor aquatic habitat and reduced fish abundance. The majority of the habitat in the reaches of stream most impacted by mining consists of moderate gradient riffles with few pools and little to no spawning habitat. The restoration design establishes a new stream channel and floodplain with appropriate sinuosity and channel grade. To create this new channel and floodplain, two general approaches would be applied. The first is to remove the gravel spoil piles adjacent to the stream channel and reshape the existing channel and floodplain to the appropriate sinuosity and grade to match reference conditions. The second approach will relocate the existing stream channel to an area in the valley bottom with a more intact floodplain with fewer gravel piles. A new stream channel and floodplain will be created in these areas then the stream will be diverted into the new channel. The newly constructed stream channel would be more sinuous, resulting in lower stream grade and more frequent pools. These lower velocity habitats will allow for spawning gravel deposition and improved spawning habitat. It is likely that the number of resident fish in the reaches of stream identified will double following restoration. Improved aquatic habitat and restoration of the channel to a more natural sinuous state would also benefit aquatic invertebrates including pearlshell mussels which are present in French Creek at low densities and also a Species of Concern in Montana. The massive sediment inputs from mining and other practices in French Creek likely contributed to the severe decline of this long-lived species in the drainage.

Pre-mining, French Gulch, Oregon Creek and Moose Creek likely were important spawning and rearing tributaries to French Creek. The areas most severely impacted by past mining practices have a stream channel that is steeper and straighter than what was present before mining which leads to increased scour potential and the transportation of spawning size gravels and other fine sediments to French Creek downstream. Restoration of Oregon Creek, French Gulch, French Creek and Moose Creek would result in a more sinuous stream channel that would mimic historic (i.e., reference) conditions and lessen the grade of the stream channel and create a functioning floodplain. Lessening the grade of the stream would encourage deposition of fine sediments including appropriately sized spawning gravels. The new channel would also be surrounded by a functioning floodplain that would slow over bank flows and allow for fine sediment deposition. With the deposition of spawning gravels in the new channel it is likely that French Gulch will become an important spawning stream for French Creek. Reduced fine sediment input to French Creek would also benefit the fishery and aquatic habitat of the mainstem stream.

In areas of French Gulch that were either minimally impacted by mining or have substantially recovered since mining but lack aquatic habitat diversity, small, minimally invasive habitat features would be added to the stream. These features include pool excavation and enhancement, the addition of woody debris, and minor channel changes. This work would be done primarily by hand crews or the use of small machinery such as spider or mini excavator to limit the impacts on existing vegetation.

Figure 4. Examples of existing habitat conditions in French Gulch showing straightened stream channel and no access to floodplain.

The second goal of placer mining restoration is to improve riparian habitat. This will be accomplished by completing the objective of restoring appropriate sized floodplains in French Gulch and Moose Creek that will allow riparian plant species to become established. For example, the average valley bottom width in French Gulch is approximately 200 ft and this area was historically covered predominantly with riparian species (as evidenced by neighboring drainages unimpacted by mining). However, mining has resulted in the relocation of the stream to one side of the valley and confinement of the channel with large gravel spoil piles. In some reaches the riparian area is limited to the immediate banks of the stream and the large gravel spoil piles either lack adequate soils for vegetation establishment or have been populated by upland species such as lodgepole pine and sagebrush. Restoring the floodplain of the stream will greatly expand the riparian areas of French Gulch and Moose Creek in mining impacted reaches by providing habitat that is accessible to groundwater and periodic flooding. Riparian habitats provide abundant foraging and breeding areas for nongame birds, reptiles, amphibians, and small mammals. The dense shrub understory and the associated edge habitat provides important nesting, feeding, and/or hiding cover for neotropical migrants, ruffed grouse, a large diversity of nongame birds, small mammals, and mid-sized carnivores such as coyote. Willow communities provide foraging areas as well as hiding and thermal cover for big game such as moose, white-tailed and mule deer, and elk. If the areas naturally attract beaver, they will by association provide enlarged and enhanced habitats for other furbearers such as mink and muskrat. Riparian corridors are also key migration corridors for both ungulates and carnivores, including mountain lions, wolves and black bears.

The third goal of this project is to improve water quality through the reduction of sediment loading to the stream by establishing a natural stream channel with well vegetated banks and increase fine sediment deposition on a restored and functioning floodplain. French Creek is listed as impaired by DEQ for fine sediment (DEQ 2009). Fine sediment is generated in mined reaches of French Gulch and its tributaries as the stream naturally attempts to re-establish a more sinuous pattern and erodes the tales of adjacent hill slopes. This is particularly evident in French Creek downstream of Moose Creek. Removing the tails and establishing a more natural stream channel and floodplain that is well vegetated will greatly reduce sediment loading. Further, because there is a nonexistent or poorly developed floodplain and the grade of the stream is artificially increased in its current state, the fine sediments generated are transported downstream and deposited in French Creek. A functioning floodplain and more sinuous channel would result in more of these fine sediments being sorted and deposited in the floodplain rather than being transported downstream.

The second water quality objective is to reduce the probability of mercury entering the stream by isolating the stream from contaminated spoil piles. French Creek flows into Deep Creek which flows into the Big Hole River. The Big Hole River is the primary drinking water supply for the city of Butte. Mercury floatation was used extensively in the early 1900's to extract gold from hydraulically mined sediments. In some ore processing areas, mercury levels pose a significant human health hazard. No significant ore processing facilities were known to be present in French Gulch, French Creek or Moose Creek. Recent testing of sediment samples from French Gulch, Moose Creek and French Creek has identified mercury in some of the dredge spoils adjacent to the stream. The areas where mercury was detected in sediment samples were limited and the levels detected were low. No mercury was found in stream sediments taken near the downstream end of the project area. The proposed design would involve the creation of a new stream channel and floodplain away from gravel piles with the greatest mercury concentration; thus greatly reducing the risk of the mercury entering the stream and water supply.

A fourth goal of the project is to improve the quantity and quality of wetland features. The objective under this goal will be to create features adjacent to the stream in the created floodplain that will access groundwater and produce shallow wetland habitats. Photographic, historic and physical evidence suggests that the entire valley bottom including the adjacent hill slopes from near the headwaters of French Gulch to its confluence with French Creek was placer mined. These mining practices were extended into the lower reaches of Moose Creek and in French Creek. It is likely that before mining occurred there were natural wetlands present throughout the floodplain in abandoned channels or oxbows or in old beaver dams. While there are still wetland features present in the drainage, they have been significantly impacted by the dredging and piling of gravel spoils and the hydraulic mining of adjacent hill slopes. Included in the restoration plans are wetland features that are adjacent to the restored stream channel. Additionally, wetland features will be created in the historic channel when channel relocation occurs as part of restoration activities. These features will provide habitat for plant and animal species that are adapted to wetland habitats including amphibians such as western toad (Species of Concern), long-toed salamander and spotted frogs.

The fifth goal is to provide fish passage in placer mined reaches of stream where fish passage has been impeded. In French Gulch a large culvert at the upstream end of the proposed restoration reach has become perched resulting in a fish passage barrier. Removal of this culvert would provide access to an additional 3 miles of stream for fish in French Gulch. The French Gulch Road is closed approximately 0.5 miles downstream of the culvert crossing location so it is not necessary to maintain a road crossing at this location. The stream has aggraded upstream of the culvert so simple culvert removal without stabilizing the stream bed would result in significant head cutting of the channel and mobilization of sediment. FWP is proposing to remove the culvert and install a series of 7 step pool weirs into the channel to gradually step the water down from the stream bed elevation upstream of the culvert to elevation downstream of the culvert. There will be pool features associated with these steps that will provide resting areas for fish attempting to negotiate upstream.

Fish passage restoration is also necessary in Moose Creek because Placer mining has resulted in the loss of direct connection between Moose Creek and French Creek. Currently as Moose Creek intersects the floodplain of French Creek it is diverted and flows parallel with French Creek. The stream runs through a series of decadent beaver complexes before draining to French Creek through a series of 3 separate drainage culverts under Highway 569. There is no evidence of the historic stream channel that once must have connected Moose Creek with French Creek. The proposed restoration design would establish a functioning stream channel between Moose Creek and French Creek and allow for unrestricted fish passage between the 2 streams.

Pending funding, it is anticipated that construction of this project would begin in the summer of 2017 and would be completed by winter of 2018. Completion of the project will result in achieving the goal of restoring the impacts of placer mining in the most impacted reaches of the drainage. Some of the restoration objectives described above will be met immediately after project completion (i.e., a more natural stream channel with higher sinuosity, lower stream grade and a functioning floodplain) while others will take time. Achieving the goal of improved riparian habitat will occur in the years following project completion as plantings, sod transplants and seeding become established and as native vegetation colonizes the area. Additionally, recovery of the fishery will occur incrementally as fish utilize the newly created habitat improvements and as the stream naturally adjusts to the changes made. The objective of mussel re-establishment will likely be the last objective met. Mussels have a very long life span (> 50 years) and the source population in French Creek is at low abundance. However, as the lower gradient, more sinuous habitat improves in French Gulch, and sediment loading to French Creek is diminished, conditions will be ideal for mussel recolonization.

2. Restoration of the Impacts of Atmospheric Deposition from the Anaconda Smelter

Mount Haggin was an important source of timber to fuel the Anaconda Smelter and provide lumber for mining related activities. Much of the upper French Creek watershed including California, American and Sixmile creeks were clearcut in the early 1900's. Flume networks and rail trams were established to move timber over the continental divide to Anaconda from the French Creek drainage. Roads were established into areas with timber, but much of the actual extraction work was done without the use of large machinery. Few trees were left in the upper drainage following the logging activities (Figure 5).

The smelting of metals in Anaconda began in a large scale in the late 1800's and early 1900's. The initial smelters were wood fired but soon converted to coal as rail service became widely used. The discharge of toxins to the atmosphere through the smelting process substantially affected the soils, crops and livestock in and around the area. In 1909 farmers in the area filed a lawsuit claiming the smelting emissions were damaging crops and livestock. The chemistry of surrounding soils was changed resulting in lowered pH and deposition of toxins such as copper and arsenic to the point that plant life was dramatically affected. In some areas plants would not grow due to the toxic nature of the soil. When the impacts of atmospheric deposition from the smelter were combined with the deforestation due to logging, massive erosion began in the hillslopes surrounding the smelter, including in the Mt. Haggin area. Sugarloaf Mountain is the epicenter for erosion and sedimentation on the Big Hole side of the continental divide (Figure 5). Erosion from the upslope areas resulted in severe sedimentation in California, Oregon and Sixmile creeks in the headwaters of French Creek which has had significant impacts on aquatic life. Anecdotes from local ranchers and empirical evidence (Oswald 1981) suggests that following summer thunderstorms French Creek would flow a grayish white color similar to tainted milk. The sediments causing this coloration were from the slopes of Sugarloaf Mountain and surrounding area.

While significant healing has occurred since the 1950's when there were few trees on the landscape (Figure 5, top), there still exists chronically eroding areas that produce significant sediment events that reach California Creek. These bare areas (Figure 5, lower) have little vegetation and the parent soils are highly erodible and generally on steep slopes. The unvegetated areas all have associated rills and gully formation (Figure 6). These steep unvegetated gullies readily transport entrained sediments to the floodplain of California Creek where they are washed into the stream. These sediments are high in copper and arsenic, and are washed directly to the streams having detrimental impacts on water quality and aquatic life.

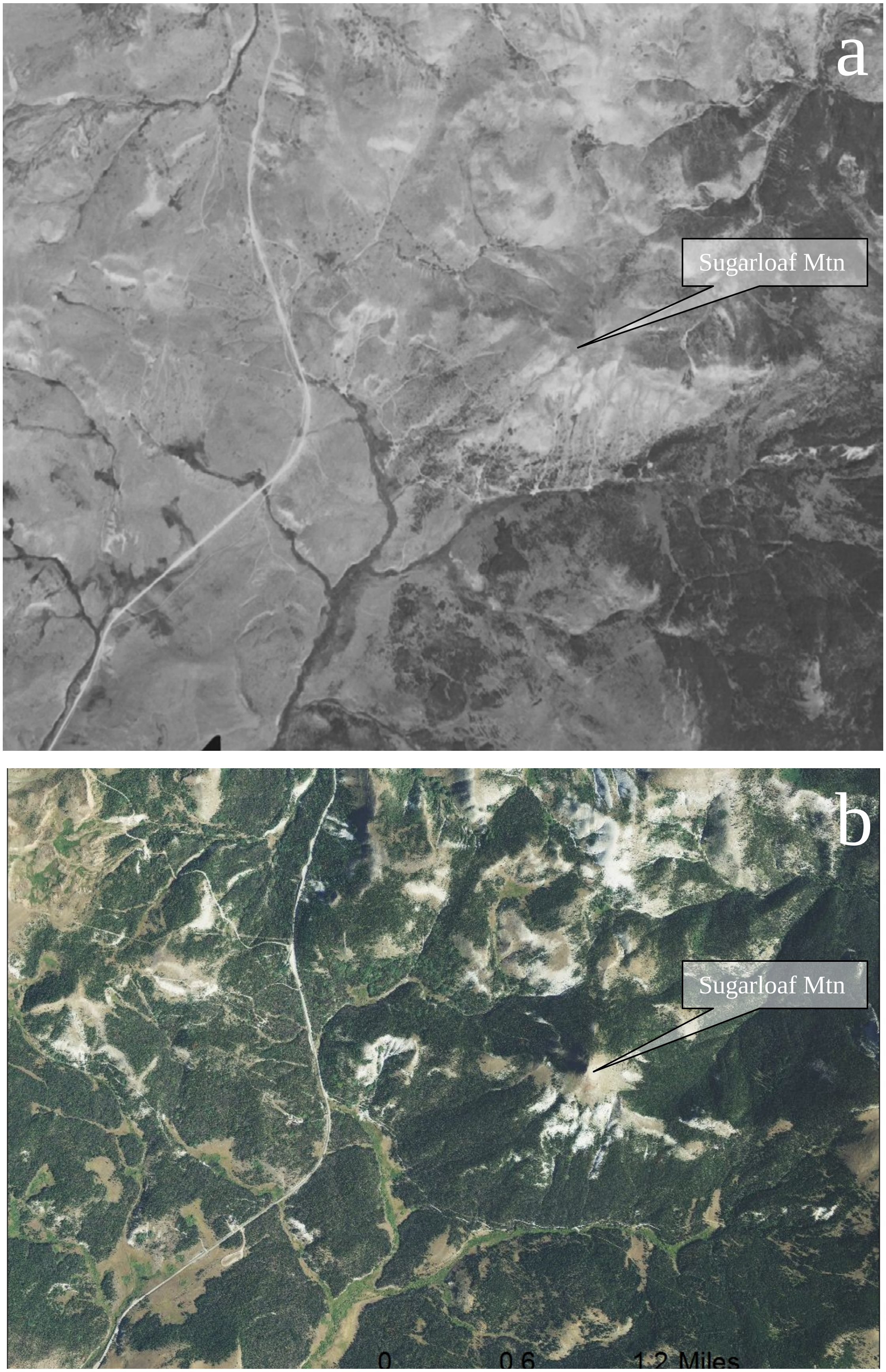

Figure 5. Top photo (a) shows Sugarloaf Mountain and the surrounding area in 1954. Note the lack of trees and other vegetation. Bottom photo (b) shows same area in 2011 and vegetation recovery in the past 57 years. Note white areas in photo b are bare dirt areas where erosion is still occurring. Examples of this erosion are shown in Figure 6.

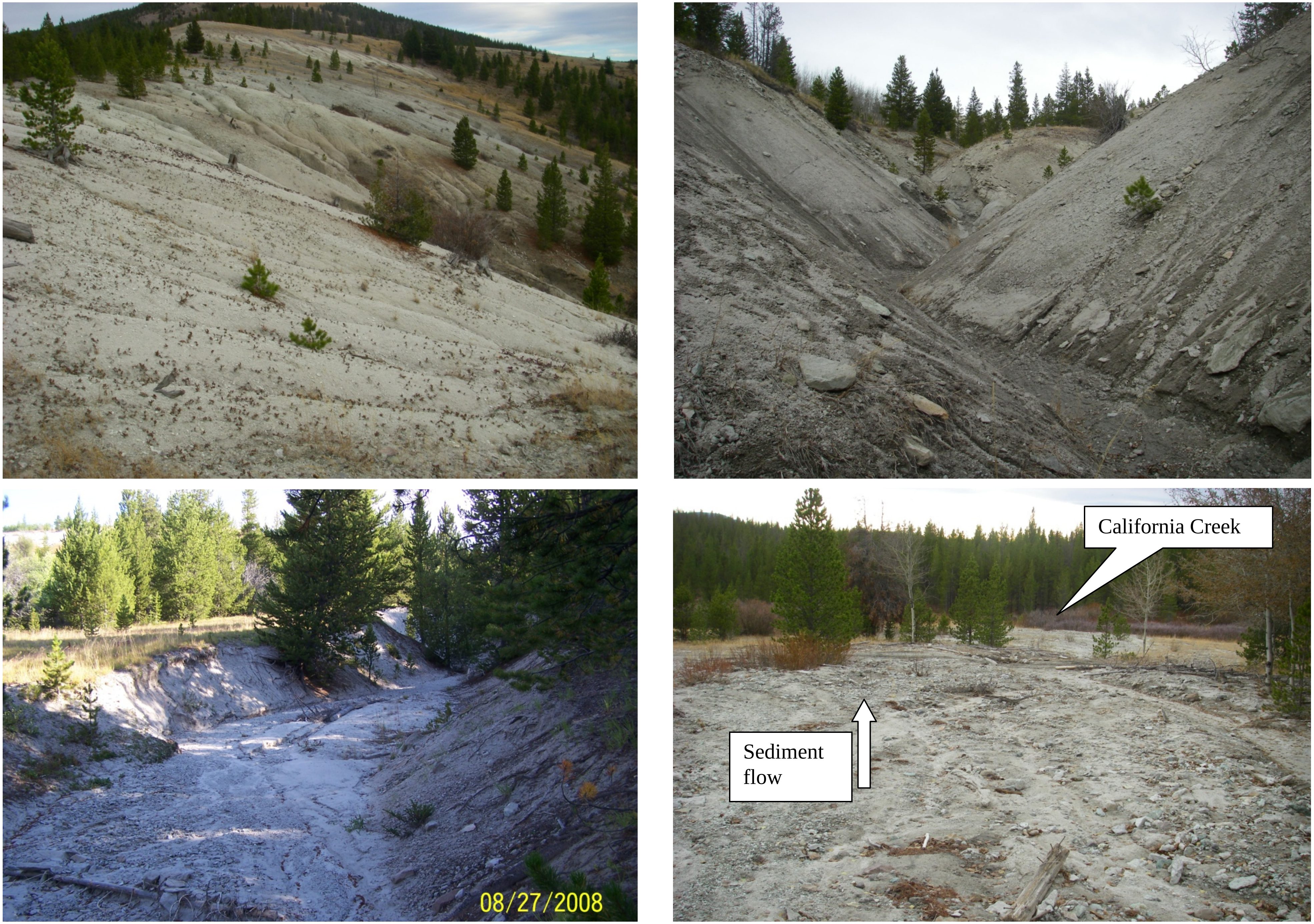

Figure 6. Current condition of slopes of Sugarloaf Mountain impacted by atmostpheirc deposition from the Anaconda Smelter. Upper left shows unvegetated slopes and upper right shows steep gully formation. Lower 2 photos show where gully converges with floodplain of California Creek.

Even if metals were not present in the material eroded from the steep slopes, the sediment alone has significant impacts on aquatic life. Excessive fine sediment loading results in the burying of stream gravels and clogging of interstitial spaces between rocks causing significant impacts on spawning fish and invertebrate life. It is likely that the erosion from the past 100 years in the French Creek drainage was a major contributor to the decline and near extirpation of native fish in the drainage and to the severe decline in native western pearlshell mussels.

Restoration of the slopes of Sugarloaf Mountain and the surrounding area will greatly reduce sediment loading to California Creek. The restoration plan for upper California Creek has 3 basic objectives. First is to establish permanent vegetation on bare slopes to reduce sediment entrainment and precipitation related erosion. Recent experiments in the California Creek watershed have indicated that in order for bare soils to grow vegetation amendments such as fertilizer, addition of organic material and a pH buffer such as lime may be necessary. Soil analysis indicates the soil is very nitrogen poor and existing plant life readily responds to nitrogen fertilizer. Aerial application of fertilizer to smelter impacted areas is planned and those areas that do not respond to fertilizer application will receive additional soil amendments and seeding or other plantings to encourage vegetation establishment. Steep areas may also be graded either using hand tools or machinery to facilitate vegetation establishment. Vegetation may be transplanted from nearby stable slopes to bare eroding slopes to provide seed and root stock for plant establishment and proliferation.

The second objective is to slow the sediment loading to California Creek through the creation of sediment retaining structures in the gullies and rills that have formed below the bare slope areas. It is likely that the establishment of permanent vegetation will take several years in the upslope areas of Sugarloaf Mountain. Therefore, to reduce the immediate impacts of eroding material sediment retaining structures are necessary. In the lower watershed near the confluence with California Creek large rock check dams would be created to slow surface flows and allow entrained sediments to settle out before reaching the stream. In the upper watershed which is inaccessible to most machinery, similar structures would be created using hand tools and local materials such as rock and wood. Imported erosion control material such as coir fabric would also be used. These structures are intended to slow the input of sediment to California Creek until the vegetative treatment proposed above become established and sediment delivery to the rills and gullies is significantly reduced. As these structures fill with sediment new structures will be constructed downstream over a period of up to 10 years as the vegetation on the hillslopes becomes established. Creating successive checks down the gullies and rills will bring the bed elevation of the gullies up to a more natural level and allow plants to become established and naturally stabilize the gully bottoms. Because the vast majority of constructed checks will be made of biodegradable materials (i.e., logs), they will eventually decompose and become part of the natural landscape.

The third objective is to enhance the riparian vegetation along the floodplain of California Creek to facilitate sediment deposition in the floodplain before flows reach the stream. These enhancements consist of riparian planting and exclusion from livestock grazing through the use of a temporary fence. Also, surface flows are being diverted in some instances to areas where a larger floodplain is present to allow sediments to settle before flows reach the stream. Additional instream beaver mimicry structures are proposed in areas where the stream has become incised and disconnected from the floodplain.

3. Highway Relocation and Fencing

Although not associated directly with this project, Montana Department of Transportation (MDT) began in 2015 to relocate an approximately 2-mile section of Highway 569 from the floodplain of French Creek to a dry bench to the south. Highway 569 was constructed between 1940 and 1950 and connects Highway 43 to the south on the Big Hole River with Highway 1 to the north near Anaconda. This road parallels Deep Creek then French Creek over the continental divide. A portion of this highway runs through the floodplain of French Creek roughly between Lincoln Gulch and French Gulch. French Creek through this reach has been straightened as a result of mining and the subsequent highway construction has locked the straightened stream channel in its current configuration. Removal of the highway from the floodplain will allow for full restoration of the French Creek stream channel and reconnection of Moose Creek with French Creek. It will also allow the stream to freely migrate across its accessible floodplain through time.

As a part of the purchase agreement in 1976 between the Nature Conservancy and the Mount Haggin Livestock Company, livestock grazing continued at its existing rate for several years after the purchase of the property by FWP. A fisheries assessment performed in the early 1980's noted livestock grazing has resulted in removal of much of the willows from the banks and floodplain of French and California creeks (Oswald 1981). It was also noted that there were many areas of mass wasting and streambank failure that were directly attributed to livestock grazing. FWP currently manages grazing on the WMA. In the French Creek drainage grazing is managed in 2 large allotments consisting of several pastures. Grazing is done at a much lower intensity and performed on a rest-rotation basis. The lower intensity grazing has resulted in the recovery of a large percentage of the willow communities in California and French creeks. On the WMA grazing is used as a tool to achieve management goals and FWP is actively seeking opportunities to adjust grazing management to improve wildlife and fish habitat.

In association with the relocation of the highway, an approximately 2 mile section of pasture fence will be relocated to the north. The existing pasture fence is in poor condition and parallels the existing Highway 569 right of way through the riparian area of French Creek. When the highway is moved, MDT will construct a new fence on the southwest side of the highway excluding livestock from access to the riparian area of French Creek from the south. A new fence will be constructed to the north of the riparian area on a high bench beginning roughly at the confluence of French Gulch and extending west and south to near the current highway 569 crossing of French Creek. These 2 new fences will exclude roughly 2 miles of French Creek from grazing, including the old road prism that has been removed and restored to wetland community. It is possible that in the future intensely-managed grazing could be used in the created riparian pasture to accomplish fish and wildlife goals (e.g., manage weeds, improve forage conditions for wildlife), but there is no rotational grazing planned within the riparian area. Additional riparian fence or pasture fencing may be considered as need.

The Montana Department of Natural Resources and Conservation owns a ½ section of property on California Creek immediately upstream of the confluence of French Gulch. This property is managed separately from FWP property and has a separate grazing lease. A riparian fence and livestock crossing has been proposed for this property to reduce impacts to the riparian area. In addition springs on the west side of California Creek would be developed to provide stock water for animals on the west side of the creek. This would allow the pasture to be divided and a deferred grazing program to be implemented. Spring development would consist of encapsulating the spring head and piping water to troughs away from the stream for livestock watering.

4. Fisheries Management

The cutthroat trout is Montana's state fish. Westslope cutthroat trout *Oncorhynchus clarkii lewisi* (WCT) were first described by the Lewis and Clark Expedition in 1805 near Great Falls, Montana, and is recognized as one of 14 interior subspecies of cutthroat trout across the west. The historical range of WCT includes Idaho, Montana and portions of Washington, Wyoming, and Alberta, Canada. In Montana, WCT occupy the Upper Missouri and Saskatchewan River drainages east of the Continental Divide, and the Upper Columbia Basin west of the Divide. Although still widespread, WCT distribution and abundance in Montana has declined significantly in the past 100 years due to a variety of causes including introductions of nonnative fish, habitat degradation, and over-exploitation (Hanzel 1959, Liknes 1984, McIntyre and Rieman 1995, Shepard et al. 1997, Shepard et al. 2003). Reduced distribution of WCT is particularly evident in the Missouri River drainage where genetically unaltered WCT are estimated to persist in less than 5% of the habitat they once occupied, and most remaining populations are restricted to isolated headwater habitats (Shepard et al. 2003; Shepard et al. 2005). Further, many of these remaining populations are at risk of extinction due to small population size and the threats of competition, predation and hybridization with non-native trout species.

The declining status of WCT has lead to its designation as a *Species of Special Concern* by the State of Montana, a *Sensitive Species* by the U.S. Forest Service (USFS), and a *Special Status Species* by the Bureau of Land Management (BLM). In addition, in 1997 a petition was submitted to the U.S. Fish and Wildlife Service (USFWS) to list WCT as "threatened" under the *Endangered Species Act* (ESA). USFWS status reviews have found that WCT are "not warranted" for ESA listing (DOI 2003); however, this finding was in litigation until 2008 and additional efforts to list WCT under ESA are possible.

In an effort to advance range-wide WCT conservation efforts in Montana, a Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout in Montana (MOU) was developed in 1999 by several federal and state resource agencies, including the BLM, Montana Fish, Wildlife & Parks, the USFS, Yellowstone National Park, non-governmental conservation and industry organizations, tribes, resource users, and private landowners (FWP 1999). The MOU outlined goals and objectives for WCT conservation in Montana, which if met, would significantly reduce the need for special status designations and listing of WCT under the ESA. The MOU was revised and endorsed by signatories in 2007 (FWP 2007). As outlined in these MOU's, *the primary management goal for WCT in Montana is to ensure the long-term* *self-sustaining persistence of the subspecies in its historical range*. This goal can be achieved by maintaining, protecting, and enhancing all designated WCT "conservation" populations, and by reintroducing WCT to habitats where they have been extirpated.

Significant progress has been made toward WCT conservation in the upper Missouri River drainage. There have been 30 projects completed over the past 10 years which have resulted in the securing of 226 miles of stream for WCT with plans to complete several more projects in the next few years. Considering that as of 2008 WCT occupied only 466 of the 11,041 miles of historically occupied habitat (4.2%), the recent restoration of over 200 miles of stream represents a 50% increase in WCT populations in the upper Missouri River system. An additional 16 WCT restoration projects have been conducted in the lower Missouri River downstream of Holter Dam that have restored 88.5 miles of stream for cutthroat trout.

In the Big Hole River drainage WCT historically occupied approximately 2,141 miles of stream. Today there are 47 conservation populations of WCT (>90% WCT) that are estimated to occupy 167 miles of habitat (6% of historic range), of which there are 17 non-hybridized populations based on data collected and assimilated roughly 10 years ago. Recent surveys conducted over the past 4 years indicate that more than 10 of these 47 populations have either been extirpated or become hybridized with non-native trout. There are only 6 secure (i.e., those that exist in the absence of non-native fish) populations that occupy 14 miles of stream in the entire Big Hole. However, over the past 4 years there have been 11 WCT restoration projects completed In the Big Hole River drainage totaling 57 miles of stream restored and secured for WCT. According to the FWP Statewide Fisheries Management Plan, the restoration goal for WCT east of the Continental Divide (Upper Missouri River Basin upstream from and including the Judith River) is to restore secure conservation populations of WCT to 20% of the historic distribution (FWP 2012); therefore, the restoration goal will be to have secured WCT populations in roughly 400 miles of streams in the Big Hole and the remaining 1,700 miles will be managed for other sport fish.

One of the goals of the proposed restoration in French Creek is to restore native fish species, including WCT, to French Creek. In the French Creek drainage there is only 1 remaining WCT population which is located in 1.5 miles of the headwaters of American Creek. The remaining 38.5 miles of stream in the drainage is occupied by non-native brook and rainbow trout. Projects which restore WCT are necessary to ensure the continued survival of the species in the drainage and elsewhere and prevent their listing as threatened or endangered. Restoration of WCT to French Creek and its tributaries would add an additional 40 miles of stream restored to WCT and would nearly double the amount of secured habitat for the native fish in the Big Hole. French Creek would represent the largest population of WCT in the Big Hole drainage and the second largest population in the Missouri River drainage. Because of its large size and several tributary streams, WCT would be able to express multiple life-histories in French Creek by migrating back and forth between mainstem and tributaries to spawn.

The Big Hole River is also the last remaining place where native, fluvial (stream dwelling) Arctic grayling remain in the lower 48 states. Montana Arctic grayling are at the southern extent of their global distribution and are discrete from other Arctic grayling populations within their circumpolar range. They are genetically and geographically distinct from populations residing in

Canada and Alaska (Kaya 1990; Peterson and Arden 2009). Glacial history and genetic data suggest that the Missouri River population was founded from individuals that survived Pleistocene glacial advance in a refuge in the upper Missouri River system or southwestern Alberta, or in both places (Redenbach and Taylor 1999; Stamford and Taylor 2004).

The historical distribution of Arctic Grayling in the upper Missouri River basin was widely but irregularly distributed upstream from the Great Falls of the Missouri (Vincent 1962). Kaya (1990, 1992a) estimated that Arctic grayling occupied approximately 2,000 km of lotic habitat within the upper Missouri River Basin in Montana and northwestern Wyoming. Grayling abundance and distribution across Montana has declined dramatically. The Big Hole River is the only remaining population of river dwelling grayling. The hypothesized reasons for the decline of Arctic grayling include: habitat degradation, overexploitation, and impacts from non-native species. A variety of impacts have caused Arctic grayling habitat to degrade including stream dewatering, channel modifications, over-grazing, riparian vegetation removal, and irrigation infrastructure modifications.

Since 1982, the U.S. Fish and Wildlife Service (USFWS) have considered protecting Arctic grayling under the Endangered Species Act (ESA). The USFWS in their 2010 finding determined that Arctic grayling of the upper Missouri River basin did constitute a Distinct Population Segment and warranted protection under the ESA, but action was precluded at that time by the need to complete other listing actions of a higher priority. In 2014 the USFWS announced that the Upper Missouri River Arctic grayling does not warrant protection under the ESA and cited recent genetic information and considerable conservation efforts by private landowners, non-government organizations, and state and federal agencies as contributing to the decision. In 2015 the USFWS decision to not list was challenged in a lawsuit that was filed in federal district court. Arctic Grayling are designated as a Species of Concern by Montana Fish, Wildlife & Parks (FWP), the Endangered Species Committee of the American Fisheries Society, the Montana Chapter of the American Fisheries Society, and the Montana Natural Heritage Program (Holten 1980, MNHP 2004); and a Sensitive Species by the U.S. Forest Service and the Bureau of Land Management.

In French Creek on the WMA there are no irrigation diversions and therefore no dewatering issues. Also, there have been significant improvements in the condition of the riparian areas of French Creek and its tributaries due to the implementation of an improved grazing management plan which included reduced livestock pressure and a rest-rotation grazing schedule. Other habitat alterations that likely affected grayling in the drainage are being addressed through the restoration activities described above. Using deductive reasoning, some biologists have hypothesized that non-native fish (primarily non-native trout) have caused grayling declines. Little scientific data exist to determine if non-native trout are associated with Arctic grayling declines. Further, there is a lack of data documenting competition with or predation upon Arctic grayling by non-native fishes making the interaction between grayling and non-native fish unclear.

In addition to restoring WCT to French Creek once non-native fish are removed, Arctic grayling would be introduced in an attempt to establish a resident population of fish in the stream. Grayling currently occupy Deep Creek, which French Creek drains into, but there has been no documented use of French Creek by Arctic grayling in recent years. The majority of stream miles in French Creek would be considered a “C” type meandering stream channel with high quality pools and abundant willows. This type of habitat is very similar to the type of habitat present farther upstream in the Big Hole River where grayling are present. If successful, French Creek would represent one of the largest tributary populations of fluvial Arctic grayling in the Big Hole drainage and the only fluvial population of grayling within their native range to exist in the absence of non-native fish. The success of grayling introduction in French Creek would provide for side-by-side comparisons of grayling populations with and without non-native fishes. This situation would help to better understand the interactions between non-native fish and native grayling and help guide future restoration efforts.

In order to restore native fish to French Creek a fish barrier will need to be constructed. A fish barrier would preclude fish from migrating upstream. A suitable location for fish barrier construction has been identified near the downstream boundary of the WMA on French Creek. The barrier would consist of an earthen dam with a concrete spillway (Figure 7). The dam would be 13-feet high and the spillway would be roughly 10-feet high. The spillway forms a small waterfall that precludes all upstream fish passage up to a 50-year flood event. The structure has been designed to pass flows up to the 100-year flood elevation through the spillway and be structurally sound. A qualified engineering firm has been contracted to design and oversee the construction of the fish barrier. The construction site would be accessed from an existing primitive road that originates from Highway 569 on the WMA. A new road would have to be constructed for approximately 0.5 miles to access the barrier site. This would be a primitive road that would be closed to public access and only used for maintenance of the fish barrier once construction is complete. Materials for barrier construction would be partly obtained on the WMA. Fill for the dam will be collected from the placer mining tails in French Gulch. This material has been undergone a geotechnical stability analysis and was found suitable for use in earthen portion of the dam (Pioneer Technical 2013). Riprap material will be obtained from a large talus slope coming down to the stream near the barrier construction site and will be used to stabilize the downstream face of the dam and the stream bed and banks immediately downstream of the barrier structure.

Figure 7. Photo of a constructed fish barrier on Cherry Creek near Melrose, MT. The barrier structure proposed for French Creek would be similar in design to the photo above.

Once the fish barrier is in place, non-native fish in the drainage upstream of the barrier would be removed using the chemical rotenone. Rotenone is a commonly used piscicide that is highly targeted at fish and has no impact on other terrestrial plants and animals and few impacts to non-target aquatic life at fish killing concentrations. Rotenone acts by inhibiting oxygen transfer at the cellular level. It is especially effective at low concentrations with fish because it is readily absorbed into the bloodstream through the thin cell layer of the gills. Mammals, birds and other non-gill breathing organisms do not have this rapid absorption route into the bloodstream. If rotenone is ingested by terrestrial organisms it is readily broken down by digestive processes and is not well absorbed through the gut; thus, terrestrial animals can tolerate exposure to rotenone concentrations much higher than those used to kill fish. The brand name of the rotenone product that would likely be used in French Creek is CFT Legumine which is a 5% rotenone solution. The label states that the target concentration of rotenone is 50 parts per billion (ppb) parts of water or 1 part CFT Legumine to 1 million parts water (1ppm). Spring areas may also be treated with the powder formulation of rotenone *(*Prentox, 7% rotenone) or a sand/powder mix to prevent fish from seeking these areas as freshwater refuges during the application. The proposed streams would be treated using drip stations which are containers that administer diluted rotenone to the stream at a constant rate of 1 ppm for 4 hours. In addition, backwaters, spring areas and small tributaries would be treated with backpack sprayers according to the label specifications. It is expected that fish killing concentrations of rotenone would be present in the streams for only 24-48 hr after application, after which time the Legumine would have naturally detoxified and diluted to below fish killing concentrations.

FWP has a long history of using rotenone to manage fish populations in Montana that spans as far back as 1948. The department has administered rotenone projects for a variety of reasons, but principally to improve angling quality or for native fish conservation. Rotenone is a naturally occurring substance derived from the roots of tropical plants in the bean family such as the jewel vine (*Derris* spp.) and lacepod (*Lonchocarpus* spp.) that are found in Australia, southern Asia, and South America. Rotenone has been used by native people for centuries to capture fish for food in areas where these plants are naturally found. It has been used in fisheries management in North America since the 1930s. The formulation of rotenone to be used in this project will likely be CFT Legumine (5% rotenone). All the waters containing fish upstream of the fish barrier would be treated including all tributaries to French Creek. The dead fish resulting from this project would be left in place in the stream to naturally decay. Studies indicate that approximately 70% of rotenone-killed fish sink and do not float (Bradbury 1986) and decompose within a week or two. Dead fish stimulate plankton and other invertebrate growth and aid in invertebrate recovery following treatment. It is likely that multiple rotenone treatments will be necessary in French Creek to completely remove brook and rainbow trout due to the large size of the drainage and the complexity of the habitat (i.e., beaver dams). A minimum of 2 and as many as 5 full stream treatments may be done in the drainage to remove non-native fish. In addition, some partial stream treatments may be needed to address remaining non-native fish in particular stretches of the stream when they are discovered. Treatments will be done in consecutive years (likely1 per year) until no fish are detected.

To prevent the CFT Legumine from traveling downstream of the proposed treatment area, potassium permanganate would be used to neutralize any rotenone remaining in the stream at the fish barrier site (see Comment 2a below, p 21). Potassium permanganate is a strong oxidizer that quickly breaks down the rotenone molecule into non-toxic compounds. FWP has developed a comprehensive detoxification procedure policy that dictates when neutralizing is to be initiated and when it can be ceased in order to protect non target areas from being impacted. Since its adoption in 2010 there have been no fish kills downstream of treatment areas. The determination of the appropriate amount of permanganate to fully neutralize any remaining rotenone is derived by on-site testing. Stream discharge would be measured prior to detoxification and the potassium permanganate would be applied at the rate specified on the CFT Legumine label (3-5 ppm) and adjusted based on on-site testing results. Neutralization would commence according to the FWP Rotenone Detoxification Policy which states that detoxification with potassium permanganate will begin no less than 2 hours before the theoretical arrival time of treated waters at the detoxification station. A meter would be used to test the waters of French Creek at the end of the detoxification zone to ensure adequate oxidation potential (0.5-1.0 ppm $KMnO_4$) is present after 30 min of contact time to completely neutralize the rotenone. In addition to direct measurement of the oxidation potential of the water, caged fish (westslope cutthroat trout from the Anaconda Hatchery, or brook trout captured in French Creek) would be placed in the stream to monitor the effectiveness of the detoxification station during the treatment. Caged fish would be placed downstream of the detoxification zone and monitored. Distress or the lack thereof in these caged fish indicates whether or not the detoxification station is effectively neutralizing the CFT Legumine. The survival of caged fish placed in the creek immediately upstream of the detoxification station indicate when rotenone is no longer present in the stream and when detoxification is no longer required. The label states that if sentinel fish in treated stream water show no signs of distress within 4 hours, the stream water is considered no longer toxic, and detoxification can be discontinued. Neutralization would continue until the theoretical time in which all treated waters have passed the fish barrier and when sentinel fish can survive for an additional 4 hours. It is anticipated that this would occur in French Creek within 24-48 hours after rotenone application.

To keep the public from being exposed to rotenone treated waters, specific public accesses would be closed during treatment. These closed areas may include secondary primitive roads that access a single drainage. These areas would only be closed when rotenone is being actively applied. Signs would be placed at stream crossings and other access points (i.e., trailheads) during the treatments including signage at stream crossings informing the public of the presence of treated waters and to keep out.

Once non-native fish are removed, WCT and Arctic grayling would be restocked into French Creek and its tributary streams. Restocking would likely occur through a combination of introduction of live fish and incubation of eggs through the use of remote streamside incubators (RSI's). To jumpstart the fishery in the stream, triploid (sterile) WCT from the Anaconda hatchery may be introduced to French Creek to provide a recreational fishery if there is public feedback that indicates that rapid creation of a fishery is desired after treatment. WCT eggs would be collected from wild sources to restock French Creek and its tributaries. These eggs would most likely come from the Cherry Creek drainage near Melrose where WCT were restored to the stream and headwater lakes 4 years ago. The fish that were used to restock the stream and lakes were from multiple sources within the Big Hole River drainage. The source for Arctic grayling reintroduction would be the Big Hole River brood stock maintained at Axolotl and Green Hollow lakes. Eggs or fry from both species would be introduced to French Creek and its tributaries for a minimum of 3-4 consecutive years after non-native fish removal is accomplished; after which time it is anticipated that the streams will become self-sustaining and will require no additional stocking.

The two main threats to WCT are non-native species competition/hybridization and habitat degradation. The primary purported threats to Arctic grayling are habitat degradation, thermal and climate changes, and predation and/or competition with non-native trout although the factors that most influence Arctic grayling status are less well known. The proposed restoration activities in French Creek will address the main threats to both WCT and Arctic grayling. If Arctic grayling establish a self-sustaining population in French Creek after non-native trout have been removed, the relationship between non-native trout and Arctic grayling will be better understood. Finally, habitat improvements and restoration will likely result in better climatic resiliency for the newly formed native fish populations. The large size of the drainage upstream of the barrier will provide for multiple habitats that will allow fish to express multiple life histories to sustain their populations. French Creek, once restored, will represent the largest native fish population assemblage in the upper Missouri River drainage and will help ensure the long-term persistence of both WCT and Arctic grayling. It will also provide a unique opportunity for anglers who want to catch native fish in their native habitat. Currently harvest of one cutthroat trout is allowed in streams and rivers and it is catch and release for grayling so there will be some opportunity for harvest in French Creek after restoration. After the fishery has been reestablished and fish population are shown to be robust, it is possible that fishing regulations could be adjusted on French Creek to allow more fish harvest if this is publicly desired.

PART II. ALTERNATIVES

Because the proposed work is a large, watershed-scale restoration project with multiple interrelated activities, the alternatives analyzed below are grouped by category (Placer Mining, Smelter Fallout and Native Fish). Therefore the alternative selected for implementation would be a combination of the three categories. For example the Proposed Action is: A4, B2, C2. The selected alternative could be any combination of the three categories below.

A. Placer Mining Restoration Alternatives:

The project alternatives for placer mining restoration are summarized below**.** Comparative analyses performed for the restoration of the placer mined areas were based on the following criteria: effectiveness, feasibility, impacts and cost.

A1. No Action

Under the No Action Alternative the stream habitat conditions in French Gulch, French Creek and Moose Creek would remain in their existing condition with poor aquatic habitat and a limited floodplain and riparian area. There would be no improvements to water quality or wetland areas and fish passage would be restricted in the upper watershed. The No Action Alternative is the easiest and cheapest alternative to implement of the alternatives considered; however it would not accomplish the goals of improving habitat and water quality. It would involve no active channel or floodplain restoration and would rely on natural processes to re-establish appropriate channel dimension and a functioning floodplain. Placer mining in French Gulch has not occurred on a large scale for nearly 100 years. In that time significant healing has occurred and in some reaches of the stream there are few visible impacts of mining. However, in other reaches the impacts after 100 years have not significantly changed, particularly in dredged areas. Dredging reverses the natural sorting of stream substrate and places coarse sediments on the surface and fine sediments are washed away or buried. Therefore, only during the highest flows is the stream able to mobilize sediment from the dredge piles and begin to establish a natural channel and floodplain. Given the extent of some of the dredge piles it is likely that relying on natural processes to reestablish a meandering channel and floodplain would take hundreds if not thousands of years. It is likely that if the No Action Alternative were implemented the stream channel would remain in its current state, which has poor aquatic and riparian habitat and limited fish and wildlife abundance. The current habitat conditions in French Gulch also have impacts on water quality through active erosion and the transport of fine sediments to French Creek downstream. Therefore, while the most cost effective and easiest to implement, the No Action Alternative does not accomplish the goal of the project to improve aquatic and riparian habitat and improve water quality in the short term or long term.

The No Action Alternative also carries the least short term risk to water quality and the stability of the stream and its banks. Active stream restoration carries risk associated with high-flow events that may occur after construction but before vegetation can become established which could cause stream bank failure and increased erosion. The existing stream channel will likely change little through time and therefore poses less risk of failure over the short-term. However, the degraded habitat will be constantly in a state of flux as the channel attempts to erode the adjacent gravel piles and establish a more sinuous pattern; thus erosion problems could persist for hundreds of years. Full channel restoration should restore natural channel features and appropriate sinuosity which will aid in long-term channel stability. Therefore, while there is greater risk of short-term failure of restored areas, by establishing a natural channel with an appropriate floodplain long-term sediment erosion should be significantly reduced.

A2. Complete Restoration

Alternative 2 would produce the most complete restoration of mining effects in French Gulch, Moose Creek and French Creek. This alternative would restore all segments of stream channel impacted by past mining practices by constructing a functioning stream channel and floodplain in all areas that still have visible impacts of mining. The stream and floodplain would be restored as near as possible to pre-mining conditions. Alternative 2 would involve the removal of all dredge spoils in French Gulch, Moose Creek, First Chance Creek and French Creek and restore the entire 5 miles of floodplain of French Gulch and 2 miles of First Chance Creek (tributary to French Gulch), 0.2 miles of Moose Creek and 1 mile of French Creek to pre-existing conditions. A new stream channel connecting Moose and French Creeks would be constructed. The culvert restricting fish passage in French Gulch would be removed and the elevation drop between upstream and downstream of the culvert would be incorporated into the recontouring of the channel and floodplain. A 1,100 ft section of the French Gulch Road that currently runs through the floodplain would be relocated to the north of the valley bottom and would be placed out of the floodplain. Excess fill generated from the excavation of the new floodplain and channel would be used to construct the road. Alternative 2 would have the greatest long-term benefit to fisheries habitat, water quality, riparian conditions and wetland features.

Alternative A2 would also encompass an additional 2 miles of stream in French Gulch upstream of Alternatives A3 and A4. Because of the steepness of the valley, this section of stream likely had low quality fish habitat prior to mining. This section also passes through the most heavily mined area of the drainage which has historical significance. In one particular reach large (3 ft) boulders are carefully stacked on either side of the stream channel forming a canyon that is in some places over 15 ft deep. The historical significance of this area would likely preclude significant stream restoration work. Further, the costs of moving this quantity of large sized material would increase project costs and the amount of quality habitat that could be created in this high gradient area would be limited.

First Chance Creek is 1 of only 2 tributary streams to French Gulch that support a fishery. The lower 2 miles of the stream were heavily placer mined and the stream channel has been straightened and is flanked by dredge spoils. The stream is moderate gradient and substrate size is large. First Chance Creek contains a limited fishery due to poor habitat conditions and the small size of the stream. Alternative 2 would include the restoration of this tributary stream to preexisting conditions with an appropriately shaped and sized channel and floodplain. This effort would require the removal or reshaping in place of large quantities of material. The steepness of the surrounding hill slopes and lack of existing access points for vehicles and machinery would make restoration of this stream challenging. Further, with the large substrate size and lack of fine substrates, it may not be possible to reshape the placer tails in place because of the potential for the stream to become subterranean. Because of this risk, the tails would likely have to be hauled off and disposed of rather than reshaped in place. Significant amounts of fine substrate including soils suitable to support plant growth would have to be imported to restore First Chance Creek to pre-existing condition. Such actions would be impractical because of the high costs and limited expected fisheries, wildlife and water quality benefits.

Although no direct cost estimates were done for performing Alternative 2, the $200 cost per/ft estimate for Alternative 3 was applied to the total linear feet of French Gulch and First Chance Creeks to approximate the total cost of the project ($4,752,000). This likely underestimates the cost of total watershed restoration because costs would likely increase in upper French Gulch and First Chance Creeks because of the large size of substrate that would need to be moved and other factors mentioned above. The removal of all placer tails would result in disturbance to areas where habitat conditions have significantly improved, particularly in French Gulch. In some areas within the lower 3 miles of French Gulch there is a healthy and wide riparian area, but the channel is still relatively homogenous and lacks pool habitat. Alternative 2 would restore these areas by reconstructing the stream channel and floodplain. This would have potentially significant impacts on existing riparian vegetation, but it would restore complete function to the stream and floodplain. Alternatives 3 and 4 would not reconstruct these areas but they would be treated with habitat improvement structures to add diversity to the channel and create pool habitats. This would leave the riparian vegetation relatively undisturbed. It may also be impractical to implement Alternative 2 because the State Historic Preservation Office (SHPO) would not likely permit the restoration of the upper 2 miles of stream because of the historical significance of this area. Because of the high cost, technical impracticability and potential conflicts with preserving historical resources, Alternative 2 was not selected as the Proposed Action and was not considered further.

A3. Strategic Restoration and Bioengineered Stream Banks

Alternative 3 would be similar to Alternative 2 for Moose Creek and French Creek proposed restoration; however in French Gulch, rather than complete restoration of all placer mining impacted areas, Alternative 3 would prioritize the most impacted reaches of stream and restoration work would occur only in the areas that would have the greatest benefits to aquatic and terrestrial habitat and water quality. Areas excluded from restoration work under Alternative 3 would include the upper 2 miles of French Gulch and all of First Chance Creek. Therefore, the restoration area under Alternative 3 would consist of only the lower 3 miles of French Gulch, 0.2 miles of Moose Creek and 1 mile of French Creek.

The lower 3 miles of French Gulch slated for restoration under Alternative 3 were partitioned into Restoration Areas. The first 2 miles upstream of Highway 569 are the most impacted by mining and consist of Restoration Areas 1 and 2. Within these priority reaches a new stream channel and floodplain would be excavated. Waste material would be disposed of primarily on site in depression areas and is the former stream channel. Some excess material will be generated through floodplain excavation and will be salvaged and stockpiled off site for use on other projects or disposed of in other appropriate manners. In some locations within Reaches 1 and 2 the channel can be relocated to areas where an existing floodplain is present rather than removing the gravel piles. By relocating the channel to areas where there is an intact floodplain the amount of waste material generated will be greatly reduced and placer spoil piles outside of the immediate restoration area would largely be left undisturbed. This would have fewer impacts on the cultural integrity of the area and would preserve the historical context of the site. An 1,100 ft portion of the French Gulch Road accessing the drainage would be relocated out of the floodplain to allow for restoration of the stream, similar to Alternative 2. The outside banks of all constructed meander bends would be fabric-covered, bioengineered soil lifts with planted willow stakes. These bioengineered banks would have a greater probability of remaining stable if a high flow event (> 10 year event) were to occur prior to vegetation becoming established thus providing more assurance that the project would not be affected by an unexpected flood.

Minor habitat improvements would be made in reaches of stream less impacted by mining or where impacts have healed (Restoration Areas 3-5). The Restoration Areas in the last mile before the confluence of Julius Gulch lack large dredge spoil piles and the riparian vegetation has recovered significantly. However, the stream channel is very homogenous with long straight riffles and few pools. Only small reaches of stream in this upper mile of French Gulch are slated for full channel and floodplain restoration. Other areas within this reach are slated for small improvements that can be done with either small machinery or by hand. Such improvements would include the excavation of pools, addition of woody structures such as logs or root wads and the placement of habitat forming boulders.

The restoration of fish passage to the upper watershed is also included in Alternatives A2-A4, but the techniques used to do this would differ between Alternative A2 and Alternatives A3 and A4. Alternative A2 would incorporate the change in stream bed elevation from upstream to downstream of the perched culvert in French Gulch into the regrading of the floodplain and stream channel. Alternative A3 and A4 would include the installation of a series of 7 step pools. The step pool features in Alternatives A3 and A4 are proposed because active channel and floodplain restoration is not proposed upstream of the culvert near the confluence of Julius Gulch and removal of the culvert without some sort of grade control would result in significant channel degradation and bed erosion upstream.

Alternative A3 would include leveling the gravel mound peaks and filling low areas to create a more natural topography in the uplands that are not associated with the creation of the stream and floodplain. This work would restore the landscape surrounding the stream to a more natural state but it would not affect stream and floodplain function. It would also disturb a significant proportion of the primarily upland vegetation (lodgepole pine and sagebrush) that has become established on the placer spoil piles. It is likely that these now upland habitats were vegetated by riparian species before mining occurred. Currently, as a result of mining both the stream bottom and adjacent hill slopes, the placer spoil piles are perched and no longer have access to groundwater. A historical inventory of the project area was completed in 2013 and submitted to SHPO along with a general description of the project goals for placer mining restoration in

French Gulch. SHPO recommended, "The placertails are an important component of the historical setting and feeling of the site. In other words, major impacts to the placer tails could have an adverse effect on the site as a whole." Therefore, complete removal or restoration of placer tails may not be feasible due to potential conflicts with historic resource preservation. Because of the greater cost of Alternative A3 with few potential advantages to achieving the goals of this project and the potential conflicts with preserving the historic nature of the area, Alternative 3 was not selected as the preferred alternative.

A4. Proposed Action

Alternative A4 is the Preferred Alternative for Placer Mining Restoration. Alternative A4 is similar to Alternative A3. However, Alternative A4 would use a combination of techniques in French Creek, French Gulch and Moose Creek to reconstruct stream banks in the restored stream and placer piles not in the restored stream channel and floodplain would be left largely undisturbed. Alternative A3 relies on a single technique to construct the outside bends of the channel (bioengineered bank); however, Alternative A4 would use a combination of native sods and plant material to reconstruct stream banks on at least 30% of outside meander bends and bioengineered banks on remaining banks. The vegetation used to reconstruct the stream banks would come from local sources within French Gulch or other nearby sources. Under Alternative A4, Montana Conservation Corps (or other similar service organization) would be contracted to perform hand labor and stream restoration in areas less impacted by mining. Further, Alternative A4 would enlist volunteers to harvest willows and thus reduce the overall costs of the project.

The expected outcomes of Alternatives A3 and A4 are similar but the costs to implement each vary because of the techniques used. Alternative A3 would use bioengineered stream bank treatment on all constructed outside meander bends of Moose Creek, French Creek and French Gulch. These treatments consist of a coir fabric soil lift and planted willow cuttings. These treatments are very labor intensive and require a significant amount of hand work. They also require more clearing and grubbing for construction access and installation. These more intensive techniques lead to a higher cost/ft of implementing stream and floodplain restoration. Alternative A4 would use existing vegetation or vegetation transplants to reform stream banks on a proportion of the outside bends. These techniques require less hand labor and are cheaper to install. They also provide quickly establishing vegetative cover and bank stabilization as opposed to having to wait for several growing seasons for planted willows and seeded grasses and sedges to take root and grow.

Alternative A4 will have the greatest natural resource benefit, fewest impacts to cultural resources and existing vegetation with a smaller overall cost than the other Alternatives considered. Five Restoration Areas were identified in the lower 3 miles of stream to have full stream channel and floodplain restoration and there is a total of 8,076 ft of stream within these reaches. Restoration Areas 1 and 2 consist of the most severely impacted reaches of French Gulch in the lower 3 miles. In these reaches of stream there are large spoil piles (> 6 ft) that severely restrict the stream and floodplain. Restoration in these high priority areas would have the greatest benefit to stream and floodplain function. There are 6,132 ft of stream that would be restored in Restoration Areas 1 and 2. Restoration areas 3-5 are in reaches of stream with fewer remaining visible impacts of placer mining (i.e., lack large piles of rock) and healthy riparian vegetation. The stream gradient is higher through this area than in Restoration Area 1-2.

However, in these upstream reaches there are few pools and the habitat consists primarily of riffles. The Restoration Areas in this upper reach are generally shorter (1,944 ft total) and involve less removal of existing vegetation to establish a more sinuous stream channel and functioning floodplain.

The general approach for restoration in identified Restoration Areas will be to reconstruct a floodplain and stream channel within this floodplain and divert the stream into this newly created habitat and plug the old channel once construction is complete. The newly constructed stream channel would be vegetated using two principal methods. First native vegetation (i.e., sod mats and mature willow transplants) would be used to establish stream banks on at least 30% of reconstructed stream reaches. These materials would be collected from the exiting stream banks or other areas in or adjacent to the streams. Using existing plants will jumpstart the revegetation of the constructed stream banks and floodplain. Remaining stream banks would receive a bioengineered treatment similar to Alternative 3. These banks of the stream would be constructed using a coir fabric wrapped soil lift seeded with native grasses and sedges and planted with willow stakes. In Restoration Areas 1-5 the channel would be relocated to portions of the valley bottom that have an intact floodplain with existing riparian vegetation. In these areas lesser degrees of excavation would be required to establish a stream channel and floodplain and there would be no need to perform extensive riparian plantings because adequate riparian vegetation already exists. In Restoration Areas 1 and 2 leveling of gravel piles in the upland areas would be limited. Additional habitat enhancements would be made to reaches of the stream not in the Restoration Areas 1-5 that were less impacted by mining or that have recovered but still lack diversity of aquatic habitat. In these areas, minor improvements would be made such as pool enhancement, the addition of woody debris and minor channel changes. This work would be done primarily by hand crews or the use of small machinery such as spider or mini excavator to limit the impacts on existing vegetation. In addition to completing the work in Restoration Areas 1-5, the culvert at the head of the project area in French Gulch would be removed and replaced with a step pool structure. The Preferred Alternative also includes relocating a section of the French Gulch road in Restoration Area 2 out of the floodplain to allow for full stream restoration identical to Alternatives A2 and A3.

Mercury contaminated sediments were identified in proposed Restoration Areas. Mercury floatation was a commonly used technique to extract gold from placer material. A total of 18 samples were collected from placer piles and 2 samples were collected from stream sediments in French Gulch. No mercury was detected in stream sediments. Very low levels of mercury (0.04 and 0.03 mg/kg) were detected in 2 of 5 samples from placer tales Moose Creek and 1 of 4 samples on French Creek (0.04 mg/kg). The highest concentrations of mercury found were in 2 of 6 samples in Restoration Area 1 on French Gulch immediately upstream of Highway 569 (0.30 and 0.12). While mercury was detected in placer sediments, the levels of mercury detected were low. The recreational cleanup standard for mercury contaminated sediments is 220 mg/kg (DEQ 1996). The recreational clean up standard is based upon potential highest exposure of recreational visitors exposed to soil/wastes, stream sediments or airborne dust. While the levels found in the sediment samples were well below the recreational exposure standard for mercury in soils, 1 sample was above the water quality threshold of 0.15 mg/kg (0.30). This sample was collected south of the existing channel in Restoration Reach 1 in French Gulch. The Proposed Action includes relocating French Gulch, which currently flows through the contaminated spoil piles, to the north into an area with a more intact floodplain and riparian vegetation and few placer spoils and away from mercury contaminated soils. This will eliminate the potential for contaminated sediments eroding into the stream channel and being transported downstream.

Cost/Benefit Analysis –

Alternative	Costs	Benefits
Alternative 1: No Action	• $0 • Poor aquatic and riparian habitat conditions • Limited fisheries potential • Reduce riparian habitat • Reduced habitat for wildlife • Chronic erosion and sediment loading to French Creek • Risk of mercury contaminated sediments entering the stream • Fish passage in upper watershed restricted • Continued lack of high quality wetlands	• Least expensive alternative • Least risk of habitat improvements failing and increasing short term sediment loading • Existing vegetation would not be disturbed and would not produce a short-term increase in sediment loading.
Restoration Alternatives		
Alternative 2	• In excess of $5,740,000 (costs estimated on a cost/ft of Alt 2 extrapolated to entire reach) • Cost prohibitive • Substantial impacts on vegetation (short-term) to remove all tailings and bioengineer all stream banks • Significant Impacts to historic resources	• Complete restoration of the impacts of mining in 8.2 miles of stream • Channel condition restored to pre-mining (reference) conditions • Improved aquatic habitat • Improved fishery in French Gulch and in French Creek downstream • Compete restoration of riparian area • Long-term improvement of water quality and sediment loading to French Creek • Improved wildlife habitat • Restoration of fish passage in upper watershed • Elimination of mercury contaminated sediments
Alternative 3	• $ 2,988,748 Million. • Cost prohibitive to complete in the short-term (2-4 years), but more feasible than Alt 2 • Evidence of mining and some impacts would still be present in French Gulch • Larger impact on existing vegetation and Alt 2 • Extended revegetation time period because using seed and willow cuttings • Mercury contaminated sediments would still be present in the drainage • Public less engaged because of lack of ability to participate in project	• Restoration of the most significant impacts of mining in French Gulch • Sinuosity and grade of most severely impacted reaches of stream restored to pre-mining (reference) condition. • Improved aquatic habitat • Improved fishery in French Gulch and in French Creek downstream • Restoration of substantial portion of riparian area • Long-term improvement of water quality and sediment loading to French Creek • Improved wildlife habitat • Restores fish passage to upper French Gulch (culvert removal) • Mercury contaminated sediments would be isolated from the stream.

Alternative 4 (Proposed Action)	• $2,042,702 • Leaves the most evidence of mining and restores only the most impacted reaches of stream • Mercury contaminated sediments would still be present in the drainage	• Most cost effective • Restores the most severely impacted areas and enhances areas with less impacts • Fast revegetation using existing plants and sods • Long-term improvement of water quality and sediment loading to French Creek • Improved wildlife habitat • Restores connectivity to upper French Gulch (culvert removal) • Mercury contaminated sediments would be isolated from the stream • Public would be engaged in project through volunteer efforts • Opportunity for MCC crews to perform hand labor

B. Smelter Fallout Restoration Alternatives:

B1. No Action

If no actions were taken to attempt to restore the areas impacted by fallout from the Anaconda Smelter the high erosion rates would continue on the slopes of Sugarloaf Mountain for a significant time into the future. As mentioned previously, significantly healing has occurred on the slopes of Sugarloaf Mountain; however, a few areas are still chronically eroding and have demonstrated little improvement over the past 50 years. These eroding areas will be very slow to revegetate and will continue to erode due to the low soil pH, low nitrogen levels and the lack of any organic material that aids in microbial growth and moisture retention. The steepness of the hill slopes also slows vegetation establishment because each year large quantities of surface material including seeds and juvenile plants are washed or blown away. It is possible that the No Action alternative would result in current erosion rates continuing into the future for as many as another 50 years. Continued erosion would have lasting impacts in California Creek and French Creek downstream. French Creek's water quality is listed as impaired by Montana Department of Environmental Quality due to excessive fine sediment loads. Under the No Action alternative this impairment would likely continue due to the large quantity of fine sediment transported to California Creek each year from the slopes of Sugarloaf Mountain.

The No Action Alternative would be the least expensive alternative considered for restoration of the slopes of Sugarloaf Mountain and it would have the fewest risks of failure. The eroding slopes of the mountain will heal through time similar to what other slopes in the area have done, but the No Action Alternative could take a significant amount of time. The other alternatives explored below also have a risk of failure. Steep slope reclamation, which is what is proposed below, has inherent risks. There have been few experimental projects where steep slope techniques have been used in mining impacted soils. Further, given the unique chemistry of mining impacted soils it is often difficult to transfer techniques from one project to another. Therefore, the actions described below are somewhat experimental and therefore at risk of failure. It is possible the techniques proposed below will not be successful at slowing erosion and establishing permanent vegetation and therefore significant amounts of money will have been spent with little improvements in sediment delivery to California Creek.

The purpose of the proposed restoration activities on the slopes of Sugarloaf Mountain is to reduce erosion and deposition of sediments and metals into California Creek. This will improve water quality, fish habitat and habitat for other aquatic organisms. The No Action Alternative would likely accomplish these goals but the timeframe in which this can be accomplished differs substantially between the alternatives considered. The No Action alternative would likely take 50 years or more before the steep slopes become vegetated and significant erosion would have occurred in the interim. Also, it is possible that the existing eroding areas could take longer to recover than 50 years since there has been little change in these specific areas in past 50 years. Alternatively, it is anticipated that significant improvements in the quantity and quality of vegetative cover and the delivery of sediment to California Creek could be significantly improved within 10 years under the alternatives described below.

B2. Proposed Action

The Proposed Action includes the implementation of measures to establish permanent vegetation on the bare slopes to reduce sediment entrainment, slow the rate of sediment delivery to the stream through the construction of multiple check dams and sediment basins and enhance the riparian vegetation of California Creek to allow the deposition of sediments before they reach the stream. Initial efforts to encourage the growth of establishing vegetation will include aerial application of fertilizer to the smelter impacted areas of Sugarloaf Mountain. Fertilizer application experiments in the restoration area show promise for encouraging plant growth, improving soil condition and stabilizing soils. Those areas that do not respond to fertilizer application will receive soil amendments. These areas will likely be those where there is bare soil and steep slopes and where there is little if any vegetation present today. These soil amendments will likely be implemented by hand crews with the aid of ATV and/or aircraft to transport materials to the site. The soil amendments include the addition of organic material (mulch), fertilizer and lime. Because much of the work being performed on the slopes of Sugarloaf Mountain is experimental, it is anticipated that the techniques used will evolve through time, but the basic premise of attempting to establish permanent vegetation to reduce soil erosion will be the primary goal. The second objective of this part of the project is to slow the sediment loading to California Creek through the creation of sediment retaining structures in the gullies and rills that have formed below the bare slope areas. In the lower watershed near the confluence with California Creek large rock check dams would be created to slow surface flows and allow entrained sediments to settle out before reaching the stream. In the upper watershed which is inaccessible to most machinery, similar structures would be created using hand tools and local materials such as rock and wood and coir fabric. The third objective is to enhance the riparian vegetation along the floodplain of California Creek to facilitate sediment deposition in the floodplain before flows reach the stream. These enhancements consist of riparian species plantings and exclusion from livestock grazing through the use of a temporary fence. Also, surface flows would be diverted in some instances to areas where a larger floodplain is present to allow sediments to settle before flows reach the stream.

The Proposed Action would be minimally invasive and would leave existing vegetation for the most part intact. Some existing vegetation would be impacted through the construction of access routes for machinery to construct the lower check dam structures. These impacts should be minimal because access roads will be constructed on areas that are not actively eroding and the road will be reclaimed after construction. Some vegetation will also be disturbed as local materials are gathered to make the check dams in less accessible areas in the upper watershed. Lodgepole pine trees (both live and beetle killed) will be harvested and used to create channel plugs in existing gullies. Harvest of local trees should have few if any impacts on soil stability or erosion because root wads will be left in the ground and trees will be harvested from adjacent areas where there is no active erosion. Ground disturbance will also be kept to a minimum through the use of crews utilizing hand tools to perform much of the restoration work in inaccessible areas. Because of FWP's wildlife management goals in the area it is important to preserve as much native vegetation as possible and encourage the growth and vitality of existing plants rather than relying on imported plants. This minimally invasive plan will also reduce the potential for weed importation and infestation and will reduce the costs of weed control. Because it is minimally invasive the Proposed Action presents fewer risk of catastrophic failure. Leaving the existing vegetation intact will provide some measure of stability if a large-scale event such as an intense thunderstorm were to hit the area shortly after the restoration techniques have been implemented.

The Proposed Action may have unintended impacts on water quality in California Creek due to the application of fertilizer to impacted slopes of Sugarloaf Mountain. It is likely that some of the applied fertilizer will be transported to California Creek where it could stimulate aquatic plant growth and overall productivity of the stream. California Creek is currently not impaired for nutrients. However, it is impaired for sediment, copper, and arsenic which originate in large part from the slopes of Sugarloaf Mountain. The potential impacts of increased productivity in the stream are anticipated to be minimal relative to the existing impacts of chronic sediment inputs to the stream.

The costs to implement the Proposed Action are difficult to determine given the evolving nature of the project and the techniques that are used going forward. However, given the results of recent experiments in the area and extrapolated costs of performing these techniques over a broader landscape, it is likely that the implementation of the proposed Action will cost near $500,000 over the next 5 years.

B3. Mechanical Recontouring and Planting

Alternative B3 would consist of an aggressive approach for re-establishing vegetation to the eroding slopes of Sugarloaf Mountain. Mechanical recontouring of the eroding slopes and gullies of Sugarloaf Mountain would consist of the use of large machinery such as bulldozers, excavators and dump trucks to move large quantities of dirt to the highly incised rills and gullies. This would reduce the slope grades into these gullies, and thus reduce water velocities and erosion. The reshaping of the area would require that significant portions of existing vegetation be removed to allow for land leveling. It is possible that some sods could be salvaged and re-used but significant sod sources in the area that could be transplanted are rare due to the depauperate nature of the plant community. It is unclear if given the steepness of some of the deepest gullies and side slopes if machinery could effectively and safely perform recontouring work. If complete recontouring were possible in all affected areas of the slopes of Sugarloaf Mountain in the Big Hole drainage a total of approximately 100 acres of ground would be treated.

Once the affected areas were recontoured the ground would be treated to facilitate plant growth and manage water drainage. Top soil would be imported and spread across the affected areas at a minimum of 2 inches deep. Organic material such as mulch, compost or peat may also be incorporated into the soil mix. Lime may also be added to areas where the pH is low. Inorganic fertilizer would also likely be applied before and/or after seeding to facilitate plant growth. Once soil was imported and treated the area would be seeded. Created drainage areas would be treated with a biodegradable erosion control fabric to reduce erosion while seeded plants become established. If successful, Alternative B3 would result in the quickest and most complete restoration of the slopes affected by atmospheric deposition. Because a large area could be completely reshaped and seeded in a relatively short time it is possible that in only a few growing seasons currently eroding hill slopes would be vegetated and producing very little sediment California Creek. The estimated cost for reshaping, importing topsoil and amendments and seeding the areas is approximately $9,500/acre for a total cost of $950,000.

In order to access the eroding slopes of Sugarloaf Mountain a network of roads would need to be established. To access these areas a minimum of 5.6 miles of new roads would have to be constructed. This system of access roads would require potentially significant earth moving to accommodate large machine traffic. Assuming an average cost of $6.25/ft of road to be constructed the total cost of road construction for accessing the impacted slopes would be over $175,000. Because of the management goals of the WMA, the constructed roads would be decommissioned after the project is complete at an additional cost of $8,500/mile of road ($46,000). Given the unstable nature of the soils in the area and to reduce the potential for road failure road construction costs may increase. Therefore, the total restoration costs of Alternative B3 would be in excess of 1.2 million dollars.

The check dams and riparian treatments in the Proposed Action above would also be implemented as part of Alternative B3. The primary difference between the alternatives is that check dams under Alternative 3 would not extend as far upstream into the gullies as the Proposed Action because these up slope areas would be recontoured.

While potentially providing the most complete and quickest restoration of the unvegetated slopes of Sugarloaf Mountain, Alternative B3 also poses the most risks. Much of the potential success of B3 would hinge on how quickly the seeded vegetation becomes established and if this precedes any major storm events. A large thunder storm could significantly impact bare soils and seeds that have not become established resulting in the loss of significant quantities of top soil and the formation of new rills and gullies. The loss of topsoil and seeds could significantly delay the establishment of permanent vegetation. Alternative B3 has the most potential of importing noxious weeds because of the extensive use of machinery and the large scale seeding which may be contaminated with unwanted plant species. Alternative B3 would also require the establishment of a road network which is not in line with the management goals of the WMA.

Because of the potential risks and the overall costs of the project, Alternative B3 was eliminated from further analysis.

C. Native Fish Restoration Alternatives

C1. No Action

The no action alternative would allow status quo management to continue. Rainbow and brook trout fisheries would remain the same in French Creek and there would be little to no use of the stream by Arctic grayling and WCT would be present only in the headwaters of American Creek. The "No Action" alternative would not fulfill the State's obligation to conserve native fish species and take action to prevent their listing as Threatened or Endangered under the Endangered Species Act. Although the 'no action" alternative would not accomplish the goals of native fish conservation, it would not have the potential negative impacts of the proposed action such as temporary impacts to non-target aquatic invertebrates. The No Action alternative would have the fewest impacts to recreation and fishing in the area because the existing fisheries would remain. The No Action Alternative would maintain the existing fishery and provide uninterrupted opportunities for angling as opposed to the proposed action which would result in the temporary lack of a fishery in the stream between fish removal and restocking and would temporarily restrict access to the stream.

The No Action Alternative would also result in the lack of a fish barrier in French Creek. With no fish barrier in place, fish from lower French Creek, Deep Creek and even the Big Hole River would have unrestricted access to the French Creek watershed. This would allow for migratory fish to move into French Creek to spawn or seek other habitats. Construction of the fish barrier would preclude these movements. The ability to migrate back and forth into tributary streams is considered an important factor in fisheries conservation and management because it often builds resiliency in fish populations and allows for the expression of multiple life-histories. Avoiding fish barrier construction would also lessen the impacts on French Creek. The proposed construction area will be disturbed at the barrier site and a new road will have to be developed to access the site. Further, the barrier will have hydrologic impacts through the impounding of water upstream of the barrier and the temporary interruption of sediment flows. The slow impounded water upstream of the barrier will allow for sediments entrained in French Creek that would normally be transported downstream to settle. Through time, the impoundment upstream will fill with sediment and normal sediment dynamics will be restored. In other areas where barrier construction has taken place, the impoundments upstream sometimes take less than one year to fill. It is likely given the size of the impoundment upstream of the French Gulch barrier that it will take several years to fill.

C2. Proposed Action: Barrier Construction and removal of non-native trout using rotenone.

Hybridized trout would be removed from the streams upstream of fish barriers using rotenone in the formulation of CFT Legumine (5% rotenone). The rotenone would be detoxified within ¼ mile downstream of the fish migration barriers using potassium permanganate to prevent impacts to non-target fish. Once fish removal is achieved and rotenone is no longer present in the streams, non-hybridized WCT and Arctic grayling would be stocked into the streams. This alternative offers the highest probability of achieving the goal of conserving native fish species. Successful completion of the proposed action would result in approximately 40 miles of habitat that would be secured for native fish in the Big Hole drainage. Further, the proposed Action would secure the one remaining population of WCT in the French Creek drainage in American Creek by eliminating the non-native fish in this stream.

Construction of a fish barrier would pose short and long-term impacts to aquatic and terrestrial resources. The construction of the fish barrier would preclude all upstream fish passage. This would prevent migratory fish from Deep Creek or the Big Hole River from accessing the creek upstream of the structure thus impacting their life history. In FWP's analysis, this impact will be minor due to the current limited use of the stream by migratory fish. Electrofishing surveys have revealed that few brown trout and no Arctic grayling currently migrate into French Creek. Significant stream miles of very similar habitat to that found in French Creek is present in Deep Creek and its tributary streams which will remain open to migratory fish. Therefore, any potential impacts to fish passage caused by the barrier should be mitigated by the large quantity of high quality habitat that will remain open in Deep Creek. The fish barrier will also temporarily impact sediment flow down French Creek. The barrier will pond water upstream of the structure causing increased sediment deposition. This will result in fewer fine sediments being transported downstream. In the short term, the impoundment upstream of the fish barrier could provide a water quality benefit. Significant amounts of fine sediment may be stored upstream of the barrier as the impoundment fills. French Creek is impaired for fine sediments so while the impoundment fills and fine sediment is stored, sediment loading to French and Deep creeks downstream will be lessened. This benefit will likely only be short term until the basin upstream of the barrier becomes full of fine sediment and a sediment balance between upstream and downstream of the barrier is restored. The fish barrier will also likely buffer areas downstream from potential sediments generated through the restoration of mining impacts in French Creek, French Gulch, Moose Creek and the slopes of Sugarloaf Mountain.

Terrestrial resources will also be impacted by the fish barrier. An additional 0.5 miles of temporary access road will need to be constructed to provide equipment access to the barrier site. This will result in impacts to soil and vegetation. At the barrier site, a small portion of riparian area will be impacted through the construction of the barrier structure which will span the valley bottom. Further, some riparian vegetation will be impacted by the impoundment upstream of the structure. It is anticipated that the impoundment upstream of the barrier will eventually fill with sediment and riparian/wetland vegetation will become established.

C3. Barrier construction and mechanical removal of non-native trout

Under Alternative C3 a fish barrier would be constructed identical to C2 (Preferred Alternative) above but removal of non-native hybridized fish in French Creek and its tributaries would be done using electrofishing rather than rotenone. Multiple-pass electrofishing has been used to eradicate nonnative trout from several small streams in northcentral Montana (Big Coulee, Middle Fork Little Belt, and Cottonwood creeks) and in SW Montana (Muskrat, Whites and Staubach creeks). Electrofishing can be an effective means of capturing fish in streams; however, electrofishing has limitations. Generally it is only 50 -70% efficient at capturing fish depending on the type of habitat and fish size distribution. Electrofishing is inefficient at capturing juvenile fish and generally electrofishing removal efforts require multiple years to allow juvenile fish to grow to the size where they can be captured. Electrofishing is also very labor intensive. The project reaches where electrofishing removals have been successful were generally less than 3 miles in length and required up to 25 electrofishing removal passes over several years to eradicate the unwanted species. Each electrofishing pass generally requires a crew of 3 to 9 people. Eradication of non-native trout from French Creek and its tributaries with electrofishing would likely be impossible due to the length of stream involved (40 miles total) and the complexity of the habitat (multiple beaver dams). For these reasons this alternative was eliminated from further consideration. Although Alternative C3 is less likely to accomplish the goals of WCT conservation in French Creek, it would not have some of the potential negative impacts of the proposed action such as temporary impacts to non-target aquatic invertebrates. Alternative C3 would also have the greatest impact on angling because it would potentially take the longest time to completely remove hybridized trout before WCT could be restocked.

C4. Angling removal of non-native trout

FWP has the authority under commission rule to modify angling regulations for the purpose of removing unwanted fish from a lake or stream. Unfortunately, this method would not result in complete fish removal for a number of reasons. First, French Creek is a relatively small stream and currently does not receive heavy fishing pressure. Attracting anglers to French Creek to harvest rainbow and brook trout would be very difficult because of the remoteness of the area, small size of the streams and small size of fish. Recreational angling has been shown to reduce the average size of fish and reduce population abundance, but rarely if ever has it been solely responsible for eliminating a fish population. Using angling techniques alone in the stream would not result in removal of non-native trout and would not achieve the objective of conserving cutthroat trout. For these reasons this method of fish removal was considered unreliable at achieving the objective of complete fish removal and was eliminated from further analysis.

PART III. ENVIRONMENTAL REVIEW

A. PHYSICAL ENVIRONMENT

1. LAND RESOURCES **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Soil instability or changes in geologic substructure?			X		Yes	1a
b. Disruption, displacement, erosion, compaction, moisture loss, or over-covering of soil which would reduce productivity or fertility?			X		Yes	1b
c. Destruction, covering or modification of any unique geologic or physical features?		X				
d. Changes in siltation, deposition or			X		Yes	1d

erosion patterns that may modify the channel of a river or stream or the bed or shore of a lake?						
e. Exposure of people or property to earthquakes, landslides, ground failure, or other natural hazard?		X				

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Comment 1a: The restoration of placer mined reaches of French Creek, French Gulch and Moose Creek will disturb the existing soil structure and could produce temporary instability if a large flow event occurs before vegetation becomes established. A large flow event could erode newly transplanted sod or engineered bank structures washing away soils. However, the restoration techniques used have been proven effective in other projects and proper engineering has been done on this project to prevent and/or mitigate any impacts to soils. Further, using a variety of techniques to stabilize stream banks should reduce the risk of large scale soil erosion from the newly constructed stream banks. FWP has concluded that the risk of significant failure and soil erosion using the techniques proposed is minimal. The intent of this restoration is to reestablish natural function to the stream channel and floodplain. A naturally functioning stream channel will through time migrate back and forth within its floodplain.

The purpose of the restoration work in upper California Creek on the slopes of Sugarloaf Mountain is to stabilize soils and the methods proposed herein should not lead to any increase risk of soil instability. The soils in the area are currently highly unstable due to the steepness of the terrain and the lack of vegetative cover. The techniques proposed for restoring eroding slopes of Sugarloaf Mountain will not increase the slopes of the hills or reduce the vegetative cover and thus there should be no increased risk of destabilizing soils.

There should be no impacts of native fish restoration or barrier construction on soil stability.

Comment 1b: The restoration of placer mined reaches of French Creek, French Gulch and Moose Creek will require the borrowing of riparian sods and woody riparian plants to reconstruct a portion of the stream banks of the new channel. This will reduce the productivity of the borrow areas because the plant cover will be reduced and unavailable for wildlife species. However, the material will be transplanted to nearby areas and there will be no net loss of productivity in the area. Further, there will likely be a long-term gain in productivity as the borrow areas will likely recover with riparian species and the new channel and floodplain will also be restored to riparian species.

The footprint of the fish barrier will cover riparian soils and plants. The impact on soils at the barrier location should be minimal because the footprint of the structure is only 0.45 acres. Barrier construction will also result in soils upstream of the barrier being inundated by water. However, it is anticipated that the impoundment upstream will fill within a few years and the soils in the area will become reestablished.

Comment 1d: The restoration work proposed in the placer mined reaches of French Creek, Moose Creek and French Gulch will result in significant channel changes. These channel changes will increase stream sinuosity, reduce the stream gradient, and reduce channel velocity.

This will allow for the deposition of finer sediments (i.e., gravels) that would have otherwise been transported downstream. This work will restore the stream channel morphology to approximate conditions that were present pre mining. The deposition of gravels is a positive benefit in these streams because it will create spawning habitat for westslope cutthroat trout and Arctic grayling.

The intent of the restoration of the slopes of Sugarloaf Mountain is to reduce siltation and erosion and encourage deposition of sediments before they reach California Creek. Check dams would be established in eroding gullies on the slopes of Sugarloaf Mountain. The intent of these structures is to slow water flows and allow fine sediments to deposit rather than being transported downstream. The revegetation work will reduce the quantity of fine sediment that is entrained during runoff and storm events. There are no anticipated impacts of siltation or erosion patterns as a result of native fish restoration or fish barrier construction.

2. WATER **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Discharge into surface water or any alteration of surface water quality including but not limited to temperature, dissolved oxygen or turbidity?			X		Yes	2a
b. Changes in drainage patterns or the rate and amount of surface runoff?			X		Yes	2b
c. Alteration of the course or magnitude of flood water or other flows?			X		Yes	2c
d. Changes in the amount of surface water in any water body or creation of a new water body?			X		Yes	2d
e. Exposure of people or property to water related hazards such as flooding?			X		Yes	2e
f. Changes in the quality of groundwater?		X				2f
g. Changes in the quantity of groundwater?		X				
h. Increase in risk of contamination of surface or groundwater?			X		Yes	2h (see also a,f)
i. Effects on any existing water right or reservation?		X				
j. Effects on other water users as a result of any alteration in surface or groundwater quality?		X			Yes	2j
k. Effects on other users as a result of any alteration in surface or groundwater quantity?		X				
l. Will the project affect a designated floodplain?		X				
m. Will the project result in any discharge that will affect federal or state water quality regulations? (Also see 2a)			X		Yes	2m

Comment 2a: While the scope of placer mining restoration is large it is anticipated that the amount of turbidity generated should be minimal. The vast majority of construction work proposed will not occur in flowing water but will be done in the dry. The new channel and

floodplain will be constructed often adjacent to the existing stream and once construction is complete flows from the creek will be diverted into the new channel and the old channel would be plugged. As water is introduced into the channel minor amounts of turbidity will be generated and these fines will be transported downstream. Much of the placer mining restoration in Moose Creek will occur in the active channel because of the inability to move the channel to a new location, but there is significantly less channel work proposed in Moose Creek. Sediment delivery to French Creek from Moose Creek should be minimal because Moose Creek flows parallel to French Creek through a large wetland complex including a series of multiple beaver dams before going under Highway 569 in 3 different places. The slower velocity in the beaver dams and associated wetlands should allow the fine sediment to settle before reaching French Creek. This should mitigate the impacts of turbidity generated in Moose Creek. Further, the long-term impacts of stream restoration should reduce sediment delivery to French Creek. The fish passage structure on French Gulch will also be constructed in the active stream channel. The reason for this is that the structure will be built in the same location as the existing culvert crossing. These impacts should be minor, however, because construction of the passage channel will likely be completed in one day and will be done at low flows.

It is possible that some of the restoration work done in the placer mined reaches could fail under high water conditions. The flow pattern the first few years after construction when vegetation becomes established will determine the risk of stream bank failure. After 1-2 years vegetation should become established and provide stream bank stability. A qualified restoration engineering firm has been hired to design the placer mining restoration to reduce the risk of stream bed failure. In FWP's determination the risk of bank failure is minimal and the restoration work proposed will restore proper function to the system; thus it is anticipated that through time the stream will adjust and migrate back and forth as a normal functioning channel. Restoring the function of the stream and floodplain will mitigate any short-term failures of the engineered bank treatments. Currently the stream lacks this ability due to the large placer piles that constrain the channel. Also, when considered in the context of the history of mining in the drainage, any turbidity generated from the proposed restoration work would be insignificant compared to the impacts of past mining.

The purpose of the restoration activities planned in California Creek is to reduce sediment delivery (i.e., turbidity) to the stream. Restoration of the vegetation on the slopes affected by the Anaconda Smelter should result in dramatic reductions in the amount of sediment entrained by heavy rains and melting snow and delivered to California Creek. The check dams and floodplain restoration will slow delivery of sediments while the vegetation becomes established. When taken in context, significantly more sediment is generated from the slopes of Sugarloaf Mountain in a single rainstorm event than what will be generated through the placer mining restoration activities farther downstream.

During barrier construction, it is likely that minimal amounts of turbidity will be generated. Barrier installation will require excavation of the streambed and banks to prepare the site and accommodate the concrete forms. The amount of turbidity generated should be minimal because work will be done in low-water conditions and water will be pumped or diverted around the construction site such that work will be done primarily in the dry area. A temporary road accessing the barrier site will need to be constructed and this road will likely ford French Creek in at least one location. Fording the stream will cause temporary turbidity. The impacts of fording the stream should be minor and temporary. Fords will be constructed in locations of a hard (cobble) stream bed and banks. If such a location is not available, cobbles will be imported to reduce turbidity. Barrier construction will be completed in 4-8 weeks after which time the roads will be closed to vehicular traffic and the fords abandoned.

The impoundment created upstream of the fish barrier will help to mitigate any impacts from turbidity generated through placer mining restoration or restoration of the slopes of Sugarloaf Mountain upstream. The fish barrier should be completed the year prior to the ground work in French Gulch, Moose Creek or French Creek and the same year as California Creek work. The impoundment upstream of the barrier should allow for fine sediments to settle thus reducing water quality impacts downstream.

The fish removal portion of the proposed project is designed to intentionally introduce a pesticide to surface water to remove non-native trout. The impacts would be short term and minor. CFT Legumine (5% rotenone) is an EPA registered pesticide and is safe to use for removal of unwanted fish, when handled and applied according to the product label. The concentration of rotenone proposed for use is one part formulation to one million parts of water (ppm).

To reduce the impact of the piscicide on water quality, a detoxification station would be established immediately downstream of the fish barrier. There are three ways in which rotenone can be detoxified once applied. The most common method is to allow natural breakdown to occur. Rotenone is a compound that is susceptible to natural breakdown (detoxification) through a variety of mechanisms such as water chemistry, water temperature, exposure to organic substances, exposure to air, and sunlight intensity (Ware 2002; ODFW 2002; Loeb and Engsrtom-Heg 1970; Engstrom-Heg 1972; Gilderhus et al. 1986). Rotenone persistence studies by Gilderhus et al. (1986) and Dawson et al. (1991) found that in cool water temperatures of 32 to 46^{o}F the half-life ranged from 3.5 to 5.2 days. Gilderhus et al. (1986) reported that 30% mortality was experienced in rainbow trout exposed to degrading concentrations of actual rotenone (0.004 ppm) in 46^{o}F pond water 14 days after a treatment. By day 18 the concentrations were sub lethal to trout. The second method for detoxification involves basic dilution by fresh water. This may be accomplished by fresh ground water or surface water flowing into a lake or stream. The final method of detoxification involves the application of an oxidizing agent like potassium permanganate. This dry crystalline substance is mixed with stream or lake water to produce a concentration of liquid sufficient to detoxify the rotenone. Detoxification is accomplished after about 15-30 minutes of exposure time between the two compounds (Prentiss Inc. 1998, 2007). FWP expects the streams would naturally detoxify down to the fish migration barrier within 24-48 hr after application of CFT Legumine because of natural breakdown processes and dilution from freshwater sources. At the fish barrier, potassium permanganate would be used to detoxify any remaining rotenone present in the stream and prevent fish killing concentrations of rotenone from traveling more than ¼ mile downstream.

Dead fish would result from this project. Bradbury (1986) reported that 9 of 11 water bodies in Washington treated with rotenone experienced an algae bloom shortly after treatment. This is attributed to the input of phosphorus to the water from decaying fish. Bradbury further notes that approximately 70% of the phosphorus content of the fish stock would be released into the water through bacterial decay. This action may be beneficial because it would stimulate algae production and would start the stream toward production of invertebrates. Any changes or impacts to water quality resulting from decaying fish would be short term and minor.

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Comment 2b: Restoration work on the slopes of Sugarloaf Mountain are intended to change the drainage pattern of water running from highly erosive slopes and gullies and reduce the rate and amount of surface runoff. Establishing vegetation on bare ground will slow the flow of water across the surface soil and foster infiltration. The check dams will also slow flows in gullies and encourage sediment deposition. Floodplain enhancement and rerouting of flood flows will also encourage sediment deposition before reaching California Creek. The changes proposed in drainage patterns related to this project should reduce the rate and amount of surface runoff.

Comment 2c: The course of water in French Gulch, French Creek and Moose Creek will be changed as a result of placer mining restoration. The current straight and steep channel will be restored to a more sinuous channel. This altered course will more closely resemble the original state of the streams prior to mining and will result in a reduction of stream velocity and stream power. A floodplain will also be restored which should further reduce stream velocity at flood flows and reduce the probability of long-term erosion.

The course of flood flows in otherwise dry tributaries to California Creek that drain from Sugarloaf Mountain will also be changed. These changes should reduce the magnitude of floodwaters by slowing their delivery to California Creek and allowing infiltration into the ground. Therefore, the proposed project should reduce the impacts on the course or magnitude of flood water or other flows in the French Creek drainage.

Comment 2d: The construction of the fish barrier on French Creek will result in a small impoundment upstream. This impoundment would represent a new water body. However, it is anticipated that the impoundment upstream will eventually fill with sediment and become a wetland with a stream channel migrating through it. Therefore, the anticipated changes in the amount of surface water in any water body or creation of a new water body should be short term and minor.

Comment 2e: The construction of the fish barrier will present a small potential exposure of people or property to flooding. The fish barrier is constructed to be able to pass the 100-year flood event through the spillway with adequate freeboard. It has been design by a qualified structural engineer using the latest techniques. The engineering company has designed multiple fish barriers across the state of Montana similar to the French Creek barrier. Project construction will also be overseen by the project engineer to ensure that proper specifications are followed. However, even with proper engineering there is a potential for the structure to fail, but this potential is extremely low. In the event of failure there are 2 residences that are occupied part time and one road crossing of Highway 569 within one mile downstream of the fish barrier. A flood analysis downstream was not performed as part of the design because the size of the impoundment upstream of the barrier does not meet the minimum standards for a high hazard dam and thus the risk to people or property of major flooding downstream if the barrier were to fail is considered minimal.

Comment 2f: No contamination of groundwater is anticipated to result from this project. Rotenone binds readily to sediments, and is broken down by soil and in water (Skaar 2001; Engstrom-Heg 1971, 1976; Ware 2002). Rotenone moves only one inch in most soil types; the only exception would be sandy soils where movement is about three inches (Hisata 2002). In California, studies where wells were placed in aquifers adjacent to and downstream of rotenone applications have never detected rotenone, rotenolone, or any of the other organic compounds in the formulated products (CDFG 1994). Case studies in Montana have concluded that rotenone movement through groundwater does not occur. For example, at Tetrault Lake, Montana, neither rotenone nor inert ingredients were detected in a nearby domestic well, which was sampled two and four weeks after applying 90 ppb rotenone to the lake. This well was chosen because it was down gradient from the lake and also drew water from the same aquifer that fed and drained the lake. In 1998, a Kalispell-area pond was treated with Prenfish 5% rotenone. Water from a well, located 65 feet from the pond, was analyzed and no evidence of rotenone was detected. In 2001, another Kalispell-area pond was treated with Prenfish 5% rotenone. Water from a well located 200 feet from that pond was tested four times over a 21 day period and showed no sign of contamination. In 2005, FWP treated a small pond near Thompson Falls with Prenfish to remove pumpkinseeds and bass. A well located 30 yards from the pond was tested and neither Prenfish nor inert ingredients were found in the well. In Soda Butte Creek near Cooke City, Montana, a well at a Forest Service campground located 50 feet from a treated stream was tested immediately following and 10 months after treatment with Prenfish and no traces of rotenone were found (Olsen 2006). Because rotenone is known to bind readily with stream and lake substrates, we do not anticipate any contamination of ground water as a result of this project.

Comment 2h: Mercury is present at low concentrations in some of the placer tail piles in Moose Creek and French Gulch. The proposed project will result in the moving of the stream channel away from the most contaminated spoil piles and thus reduce the risk of mercury entering the stream. Therefore, this project is intended to reduce the risk of contamination of surface or groundwater. It should be noted that only one sediment sample revealed mercury levels greater than the drinking water standard and that mercury levels for the most part are hundreds of times less than the recreational exposure limits.

Comment 2j: The CFT Legumine label states "….Do not use water treated with rotenone to irrigate crops or release within 1/2 mile upstream of a potable water or irrigation water intake in a standing body of water such as a lake, pond or reservoir…" There are no irrigation diversions within the proposed treatment area. Irrigation diversions are present on the mainstem of Deep Creek downstream of the confluence French Creek. Any rotenone treated waters would be fully neutralized before reaching these diversions and there should be no effect on water use as a result of any of the phases of the proposed work.

Comment 2m: Construction of the fish barrier and restoration of the impacts of placer mining will result in the generation of minor amounts of turbidity. This will require obtaining permits from the Montana DEQ who regulates and enforces laws regarding water quality. Regulation of storm water will also occur to prevent storm discharge from degrading water quality. This discharge is also regulated by the Montana DEQ. FWP would submit a Notice of Intent for the purpose of applying a pesticide to a stream from Montana DEQ under the Pesticide General Permit.

Cumulative Impacts: The proposed restoration of placer mining impacts and the impacts from the Anaconda Smelter are anticipated to only minimal and short term impacts on water quality and no impacts on water quantity. Minor amounts of turbidity are anticipated during project construction. However, one of the long-term objectives of this project is to improve water quality through the restoration of degraded streams, floodplains and uplands. Therefore, cumulatively this project will potentially have significant benefits to long-term water quality.

The proposed action of piscicide treatment would have a short-term impact on water quality (piscicides) in French Creek and its tributaries. Because of the rapid breakdown rate of CFT Legumine and active neutralization at the fish barriers, these impacts would attenuate through time and would not impact long-term water quality or the productivity of fisheries resources after restocking. FWP does not expect the proposed actions to result in other actions that would create cumulative impacts to water resources in the proposed streams nor does FWP foresee any other activities in the basin that would add to impacts of the proposed action. As such there are no cumulative impacts to water resources related to treatment of proposes streams with piscicides or the associated barrier construction.

3. <u>AIR</u> **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Emission of air pollutants or deterioration of ambient air quality? (also see 13 (c))			X		Yes	3a
b. Creation of objectionable odors?		X				3b
c. Alteration of air movement, moisture, or temperature patterns or any change in climate, either locally or regionally?		X				
d. Adverse effects on vegetation, including crops, due to increased emissions of pollutants?		X				
e. Will the project result in any discharge which will conflict with federal or state air quality regs?		X				

Comment 3a: Machinery that will be used to restore the impacts of placer mining and the slopes of Sugarloaf Mountain and to construct the fish barrier will result in the increase in exhaust fumes produced in the area. This impact should be minor and temporary as there are no air quality restrictions in the area and the amount and duration of the productions of emissions should be minimal. Airborne dust from construction work in the area will increase through the excavation of dry sediments and construction traffic. The majority of roads that will be used to perform the work described above are unimproved dirt roads and therefore, as machinery travels the roads dust will be generated. Traffic use of the access roads will increase over existing use with construction activities but the production of dust should only pose local minimal impacts to air quality. These air quality impacts can be mitigated through the use of watering trucks to wet road surfaces to reduce dust.

Comment 3b: The advantage of CFT Legumine over other rotenone products is that it has less petroleum hydrocarbon solvents such as toluene, xylene, benzene and naphthalene which have a strong odor. By comparison, Prenfish has a strong chemical odor after application as opposed to CFT Legumine which is virtually odor-free and performs nearly identically to Prenfish.

Cumulative Impacts: Impacts to air quality from the proposed actions would be short term and minor. FWP does not expect the proposed action to result in other actions that would create cumulative impacts to air quality in the French Creek drainage. Nor does FWP foresee any other activities in the basin that would add to impacts of the proposed action. As such there are no cumulative impacts to air quality related to treatment of the proposed streams with piscicides or associated barrier construction.

4. VEGETATION **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Changes in the diversity, productivity or abundance of plant species (including trees, shrubs, grass, crops, and aquatic plants)?			X		Yes	4a
b. Alteration of a plant community?			X		Yes	See 4a
c. Adverse effects on any unique, rare, threatened, or endangered species?		X				4c
d. Reduction in acreage or productivity of any agricultural land?		X				
e. Establishment or spread of noxious weeds?			X		Yes	4e
f. Will the project affect wetlands, or prime and unique farmland?		X				

Comment 4a: The restoration of placer mining in the French Gulch area, including Moose and French creeks, will result in the disturbance and alteration of plant communities in the areas proposed for renovation. Riparian sods and mature woody plants will be salvaged and transplanted to form the banks of newly constructed stream channels. This material will be

collected from the existing channel and other suitable borrow sources in and around the French Gulch drainage. These borrow sources will be reclaimed and reseeded. Dormant willow stakes will also be harvested and used to establish willows along the stream and constructed floodplain. These willow stakes will be harvested from local plants in the French Creek drainage. The placer piles adjacent to the streams have mostly been colonized by upland species such as lodgepole pine and sage brush. The vegetation in these areas was likely formerly colonized riparian species such as sedges, willows, alder and birch. The newly established floodplain will result in the removal of some of the dredge piles. All of the created floodplain areas will be reseeded and replanted with appropriate native plants species. Existing vegetation will be salvaged and reused as much as possible to facilitate rapid revegetation and reduce the risk of importing non-native plants. The impacts to vegetation resulting from placer mining restoration are anticipated to be short term and minor. One of the goals of mining restoration is to restore riparian vegetation in the area.

Restoration of the slopes of Sugarloaf Mountain should have significant benefits for diversity, productivity and abundances of local plant communities. The ultimate goal of the smelter related restoration is to establish permanent vegetation on bare slopes to reduce erosion. Those slopes of Sugarloaf Mountain that support permanent vegetation experience very little erosion during high precipitation events as opposed to the mass wasting that occurs on bare slopes. There will be short-term and minor impacts to vegetation as lodgepole pine trees are harvested for the creation of check dams and other erosion control devices. These impacts should be minor as no trees that are facilitating slope stability will be removed and the root masses of the removed trees remain intact in the ground. Further, the trees are harvested from areas where there is adequate ground cover with grasses and forbs. There will also be some disturbance to vegetation as a result of temporary road construction to access the areas where construction machinery will be used to construct check dams and other structures. These impacts should be minor and can be mitigated by constructing the roads in areas that are not prone to erode or in the gully bottoms where there is no vegetation and through the reclamation and reseeding of the road once construction is complete. Therefore, there are only short-term and minor impacts to vegetation anticipated as a result of the restoration work on the slopes of Sugarloaf Mountain, but there are significant long-term positive impacts anticipated to vegetation on restored slopes.

There would be some disturbance of vegetation along the stream during the proposed treatment due to increase foot traffic. These impacts should be minimal because all streams have existing trails (some primitive) or roads that provide good foot and/or vehicular access to the sites. FWP anticipates any impacts to plants resulting from trampling would be unnoticeable within one growing season. Rotenone does not affect plants at concentrations used to kill fish. Vegetation disturbances are expected to be short term and minor.

Comment 4c: The following information was extracted from a Biological Recourses Report prepared for Montana Department of Transportation (MDT) which covers the same area as the work proposed work for this project (MDT 2014). The Montana Natural Heritage Program identified two plant Species of Concern (SOC) within one mile of the project area: Hooker's balsamroot (*Balsamorhiza hookeri);* and Primrose monkeyflower *(Mimulus primuloides).* The whitebark pine (*Pinus albicaulis)* is a candidate species for listing under the Endangered Species Act.

Hooker's balsamroot (*Balsamorhiza hookeri*) has a Montana state rank of S3 and a global rank of G5 (Natureserve 2013). Hooker's balsamroot is not ranked by any federal agencies such as USFWS, USFS, and BLM. Hooker's balsamroot is found in sagebrush steppe, in open and woodland environments at elevations from 4,500 to 7,000 ft. It is primarily located on well drained soils, but also found on gravelly to clayey soils. Hooker's balsamroot is found throughout the western US. It is known in Montana in only two places: in the vicinity of Monida and within the Mount Haggin WMA. The Mount Haggin WMA occurrences are the northeastern-most known population of the species.

Hooker's balsamroot occurs within the proposed construction zone of the project area. Five occurrences of Hooker's balsamroot are reported within ½ mile of Secondary 569 in the vicinity of the project. However, no sites have been identified within the proposed construction area for placer mining or the fish barrier. No surveys were conducted for Hooker's balsamroot on the slopes of Sugarloaf Mountain because suitable habitat for the plant is not present. Therefore, there should be no impacts to this sensitive plant species.

Primrose monkeyflower (*Mimulus primuloides*) has a Montana state rank of S3 and a global rank of G5 (Natureserve 2013). Primrose monkeyflower is also ranked as sensitive by two federal agencies including USFS and BLM. Primrose monkeyflower is typically found in wet meadows and montane fens often dominated by Sphagnum moss in the alpine and subalpine zones. These zones include moderate-to-high elevation systems found throughout the Rocky Mountains. They are dominated by mostly herbaceous species associated with wetter sites with very low-velocity surface and subsurface flows. These systems typically occur in cold and moist basins with seeps and alluvial terraces of headwater streams (Hansen et al., 1995). Primrose monkeyflower occurs throughout the west coast from Washington to California, east to southwestern Montana.

Primrose monkeyflower is not known to occur within the proposed project area slated for active construction. The known occurrence reported by the *Species of Concern Data Report* is located north of the project area at a higher elevation and within a more predominate wet meadow with adjacent forests communities. Based on current knowledge of the location of the plant and proposed design, the project would not impact the primrose monkeyflower. It is possible that the plant species is present in wet areas adjacent to areas slated for placer mining restoration but none have been identified. It is also possible that some trampling could occur due to increased foot traffic along the proposed streams during treatment with rotenone; however, these impacts should be minimal because all streams have existing trails or roads that provide good foot and/or vehicular access to the sites. Rotenone has no impacts on aquatic or terrestrial plant species at fish killing concentrations.

Whitebark pine is a candidate species that occurs in the major mountain ranges of Montana at high elevations and in subalpine habitat. The project area does not contain any habitat suitable for whitebark pine. No whitebark pine trees were observed during field surveys. Due to the lack of whitebark pine or occurrence of suitable habitat in the project area, the proposed project is ***not likely to jeopardize the continued existence*** of the whitebark pine. Therefore, no further analysis of whitebark pine is necessary in this document.

Comment 4e: Machinery and equipment used during the project may inadvertently carry noxious weeds to the project site. Proposed mitigation includes washing all construction equipment and vehicles before entry onto the project site and removal of mud, dirt, and plant parts from project equipment before moving into the project area. FWP performs routine weed monitoring and spraying on the WMA. The disturbed areas will be monitored by FWP for the presence of weeds following construction activities and any weeds identified will be sprayed. The BLM has committed to performing weed monitoring and spraying on disturbed lands on Moose Creek.

Cumulative Impacts: Negative impacts to vegetation from the proposed action would be short term and minor; however the positive impacts of vegetation restoration are anticipated to be long term and significant. FWP does not expect the proposed action to result in other actions that would create cumulative impacts to vegetation in the French Creek drainage. If the new fisheries were to attract more recreational use, vegetation could potentially suffer from increased trampling. However, based on other similar WCT and grayling fisheries and their limited angling use, FWP concludes that it is very unlikely that the new fisheries would attract significant interest and associated higher use levels. FWP does not foresee any other activities that would add to impacts of the proposed action. As such there are no cumulative impacts to vegetation related to the proposed action.

5. <u>FISH/WILDLIFE</u> **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Deterioration of critical fish or wildlife habitat?		X				
b. Changes in the diversity or abundance of game animals or bird species?			X		Yes	5b
c. Changes in the diversity or abundance of nongame species?			X		Yes	5c
d. Introduction of new species into an area?		X				
e. Creation of a barrier to the migration or movement of animals?			X		Yes	5e
f. Adverse effects on any unique, rare, threatened, or endangered species?			X			5f
g. Increase in conditions that stress wildlife populations or limit abundance (including harassment, legal or illegal harvest or other human activity)?			X			5g
h. Will the project be performed in any area in which T&E species are present, and will the project affect any T&E species or their habitat? (Also see 5f)			X		Yes	See 5f
i. Will the project introduce or export any species not presently or historically			X			5i

occurring in the receiving location? (Also see 5d)						

Comment 5b: The native fish restoration portion of this project is designed to eradicate rainbow and brook trout (game fish) in the French Creek drainage upstream of the fish barrier. However, these impacts are minor and temporary because WCT and Arctic grayling (also game fish) would be restocked to populate the streams. Therefore, there would be no net loss of habitat occupied by self-sustaining populations of wild game fish. There would be no proposed changes in the fishing regulations as a result of this project; therefore, once WCT become established it will be catch and release only for Arctic grayling and a one fish limit for westslope cutthroat trout. It is possible that once the reintroduced native fish become established, they may be able to support some degree of angler harvest, but that determination will be made in the future. Rotenone when applied at fish killing concentration has no impact on terrestrial wildlife including birds and mammals that consume dead fish or treated water.

Comment 5c:

Aquatic Invertebrates:

It is anticipated that the placer mining restoration area will have short term impacts on aquatic invertebrates. These impacts will come primarily through the relocation of the existing stream channel. The invertebrates that are present in the existing channel will be cut off from all surface flows once water is introduced into the restored channel. Groundwater will likely be present in the abandoned channel, but flow will likely be greatly reduced. Further, the plugging of the former channel will bury existing invertebrate habitat. However, the abandoned channel will become a series of shallow ponds or slow flowing waters which will be occupied by invertebrates. The restored channel will be void of invertebrates, but will quickly be colonized by emigrating organisms. Between each restoration reach in French Gulch there are areas of undisturbed stream that will serve as sources for invertebrates to colonize the new channel segments. In Moose Creek and French Creek there are miles of stream upstream of the restoration reaches that could provide invertebrate colonists to these reaches. It is anticipated that within one year of restoration that aquatic invertebrates will have recovered in the restoration reaches. Because the stream channel in the restored reaches will be longer than the historic channel there will be more invertebrate habitat than previously available. The creation of wetland features adjacent to the stream will provide additional aquatic habitat for lentic invertebrates.

The heavy sediment loading from the eroding slopes of Sugarloaf Mountain have substantial impacts on aquatic invertebrates in California Creek. Excessive fine sediment loading leads to the filling of interstitial spaces between stream gravels that are important for invertebrate habitat (Figure 8). In some cases the normal gravel substrate has been completely buried. Excessive sedimentation leads to a simplified invertebrate community with only those species tolerant to high-sediment levels. Reducing sediment loading to California Creek will eventually have positive impacts on the diversity and abundances of invertebrates in California Creek and French Creek downstream. It is likely that the improvements in invertebrate habitat will occur gradually through time as sediment inputs are reduced and the accumulated sediment in the stream is slowly transported downstream. Western pearlshell mussels also stand to benefit greatly from the habitat and native fish restoration proposed herein (discussed in greater detail under Sensitive Species below).

Figure 8. Unnamed tributary to California Creek impacted by sediment from the eroding slopes of Sugarloaf Mountain.

Numerous studies indicate that rotenone has temporary effects on aquatic invertebrates. The most noted impacts are temporary and often substantial reduction in invertebrate abundance and diversity. In a study of the impacts of a rotenone treatment in Soda Butte Creek in south-central Montana, aquatic invertebrates of nearly all taxa declined dramatically immediately post rotenone treatment; however, only one year later nearly all taxa were fully recovered and at greater abundance than pre treatment (Olsen and Frazer 2006). One study reported that no long-term significant reduction in aquatic invertebrates was observed due to the effects of rotenone, which was applied at levels twice as high as the levels proposed for this project (Houf and Campbell 1977). Some have reported delayed recovery of taxa richness (number of taxa present) following rotenone treatments, but many of these treatments were at higher concentrations than proposed in this treatment (Mangum and Madrigal 1999). Finlayson et al. (2010) summarized high concentrations of rotenone (>100 ppb) and treatments exceeding 8 hours, typically resulted in severe impacts to invertebrate richness and abundance. Conversely, lower rotenone concentrations (<50 ppb) and treatments less than 8 hours, resulted in less impact to invertebrate assemblages. Chandler and Marking (1982) found that bivalves and snails were between 50 and 150 times more tolerant than fish to Noxfish (5% rotenone formulation). In all cases, the reduction of aquatic invertebrates was temporary, and most treatments used a higher concentration of rotenone than proposed for these projects (Schnick 1974). In a study on the relative tolerance of different aquatic invertebrates to rotenone, Engstrom-Heg et al. (1978) reported that the long-term impacts of rotenone are mitigated because those insects that were most sensitive to rotenone also tended to have the highest rate of recolonization. Temporary changes in aquatic invertebrate community structure due to a rotenone treatment could be similar to what is observed after natural (e.g., fire) and anthropogenic (livestock grazing) disturbances (Wohl and Carline 1996; Mihuc and Minshall. 2005; Minshall 2003), though the physical impacts and resulting modifications of invertebrate habitat and assemblages after these types of disturbances can last for a much longer period than a piscicide treatment.

Because of their short life cycles (Anderson and Wallace 1984), good dispersal ability (Pennack 1989), and generally high reproductive potential (Anderson and Wallace 1984), aquatic invertebrates are capable of rapid recovery from disturbance (Boulton et al. 1992; Matthaei et al. 1996). Headwater reaches and tributaries to the proposed native fish restoration streams that do not hold fish would not be treated with rotenone and would provide a source of aquatic invertebrate colonists that could drift downstream. In addition, recolonization would include aerially dispersing invertebrates from downstream areas.

The possibility of eliminating a rare or endangered species of aquatic invertebrate in the proposed streams by treating with rotenone is very unlikely. In SW Montana, as part of separate MEPA processes, aquatic invertebrates have been routinely collected prior to WCT restoration projects in mountain streams (e.g., Eureka, Little Tepee, Little Tizer, Elkhorn, Crazy, Whitehorse, Soda Butte creeks). In all cases, these collections have shown aquatic invertebrate assemblages typical of headwater streams in southwestern Montana, and in no cases have threatened or endangered species been discovered. Aquatic invertebrates will be collected from French Creek prior to treatment with rotenone and one year and five year post treatment to monitor the recovery of aquatic invertebrate populations in both rotenone treated reaches and restored reaches of stream. FWP expects that the proposed streams contain the same type of aquatic invertebrate assemblages found in other nearby streams and the possibility of eliminating a rare or endangered species is minimal. If a sensitive species is present in French Creek, FWP would work with Montana Natural Heritage Program biologists to develop a plan to mitigate the potential impacts on that species.

Based on these studies, FWP would expect the aquatic invertebrate species composition and abundance in the streams proposed for treatment with rotenone to return to pre-treatment diversity and abundance within one to two years after treatments are complete. Therefore, the impacts to aquatic invertebrate communities should be short-term and minor.

Birds and Mammals:

Mammals are generally not affected by rotenone at fish killing concentrations because they neutralize rotenone by enzymatic action in their stomach and intestines (AFS 2002). Studies of risk for terrestrial animals found that a 22 pound dog would have to drink 7,915 gallons of treated water within 24 hours, or eat 660,000 pounds of rotenone-killed fish, to receive a lethal dose (CDFG 1994). The State of Washington reported that a half pound mammal would need to consume 12.5 mg of pure rotenone to receive a lethal dose (Bradbury 1986). Considering the only conceivable way an animal can consume rotenone under field conditions is by drinking lake or stream water or consuming dead fish, a half pound animal would need to drink 16 gallons of water treated at 1 ppm to receive a lethal dose of rotenone.

The EPA (2007) made the following conclusion for small mammals and large mammals;

> *When estimating daily food intake, an intermediate-sized 350 g mammal will consume about 18.8 g of food. Using data previously cited from the common carp with a body weight of 88 grams, a small mammal would only consume 21% (18.8/88) of the total carp body mass. According to the data for common carp, total body residues of rotenone in carp amounted to 1.08 µg/g. A 350-g mammal consuming 18.8 grams represents an equivalent dose of 20.3 µg of rotenone; this value is well below the median lethal dose of rotenone (13,800 µg) for similarly sized mammals. When assessing a large mammal, 1000 g is considered to be a default body weight. A 1,000 g mammal will consume about 34 g of food. If the animal fed exclusively on carp killed by rotenone, the equivalent dose would be 34 g *1.08 µg/g or 37 µg of rotenone. This value is below the estimated median lethal equivalent concentration adjusted for body weight (30,400 µg). Although fish are often collected and buried to the extent possible following a rotenone treatment, even if fish were available for consumption by mammals scavenging along the shoreline for dead or dying fish, it is unlikely that piscivorous mammals will consume enough fish to result in observable acute toxicity.*

Similar results determined that birds required levels of rotenone at least 1,000 to 10,000-times greater than is required for lethality in fish (Skaar 2001). Cutkomp (1943) reported that chickens, pheasants and members of lower orders of *Galliformes* were quite resistant to rotenone, and four day old chicks were more resistant than adults. Ware (2002) reports that swine are uniquely sensitive to rotenone and it is slightly toxic to wildfowl, but to kill Japanese quail required 4,500 to 7,000 times more than is used to kill fish.

The EPA (2007) made the following conclusion for birds;

> *Since rotenone is applied directly to water, there is little likelihood that terrestrial forage items for birds will contain rotenone residues from this use. While it is possible that some piscivorous birds may feed opportunistically on dead or dying fish located on the surface of treated waters, protocols for piscicidal use typically recommend that dead fish be collected and buried, rendering the fish less available for consumption (see Section IV). In addition, many of the dead fish will sink and not be available for consumption by birds. However, whole body residues in fish killed with rotenone ranged from 0.22 µg/g in yellow perch (Perca flavescens) to 1.08 µg/g in common carp (Cyprinus carpio; Jarvinen and Ankley 1998). For a 68 g yellow perch and an 88 g carp, this represents totals of 15 µg and 95 µg rotenone per fish, respectively. Based on the avian subacute dietary LC_{50} of 4,110 mg/kg, a 1,000-g bird would have to consume*

274,000 perch or 43,000 small carp. Thus, it is unlikely that piscivorous birds will consume enough fish to result in a lethal dose.

Amphibians and Reptiles:

Potential amphibians and reptiles found within the proposed treatment areas include: long-toed salamanders (*Ambystoma macrodactylum*), spotted frogs (*Rana pretiosa*), western toads *(Bufo boreas)* (amphibians), tailed frogs (*Ascaphus montanus*) and western terrestrial garter (*Thamnophis elegans*), common garter (*T. sirtalis*) and rubber boa (*Charina bottae*) snakes (reptiles). There may be some impacts to amphibian habitat as a result of the restoration of placer mined areas. Placer mining has created limited backwater areas in some of the restoration reaches. These areas will be dewatered from surface flows once the new channel is constructed. It is possible, but not anticipated, that these areas could become dewatered completely and thus would result in the loss of amphibian breeding habitat. It is more likely that these areas will continue to be ponded through the presence of groundwater. The existing channel will be plugged following restoration, but groundwater will likely maintain some water in the historic channel. This will likely create a long narrow wetland feature that would provide additional amphibian habitat. Within the floodplain of the restored channel, wetland features will be created. These shallow wetlands should also serve as amphibian breeding and adult habitat.

There are no anticipated impacts of restoring the slopes of Sugarloaf Mountain on non-game species other than those previously identified.

Rotenone can be toxic to gill-breathing larval amphibians, though air breathing adults are less sensitive. Chandler and Marking (1982) found that Southern Leopard frog tadpoles were between 3 and 10 times more tolerant than fish to Noxfish (5% rotenone formulation). Grisak et al. (2007) conducted laboratory studies on long-toed salamanders, Rocky Mountain tailed frogs (*Ascaphus truei*), and Columbia spotted frogs and concluded that the adults of these species would not suffer an acute response to Prenfish at trout killing concentrations (0.5-1 ppm) but the larvae or tadpole stage would likely be affected. These authors recommended implementing rotenone treatments at times when the larvae are not present, such as the fall, to reduce the chance of exposure to rotenone treated water and potential impacts to larval amphibians. The proposed streams would be scheduled for treatment in late July through September, which would reduce but not eliminate potential impacts to larval amphibians. Any reduction in amphibian abundance would be expected to be short term because of the low sensitivity of adults to rotenone, and because most larval amphibians, with the exception of tailed frogs would have metamorphosed by August. Tailed frogs live in fast flowing mountain streams and spend multiple years as tadpoles before metamorphosing into air breathing adults. Tailed frogs have been documented only in Sixmile Creek in the French Creek watershed. The upper 3 miles of Sixmile Creek were treated with rotenone in 2013 and again in 2014 to remove brook trout. Following these treatments tailed frog tadpoles were still present in the stream. A reduced abundance of aquatic invertebrates may temporally impact larval and adult amphibians that prey on these species, though the aquatic invertebrate community would recover rapidly. Reptiles (air-breathing) would not be directly impacted by rotenone treatment. Some snakes are known to consume fish from streams; therefore, there could be temporary reduction in available food as a result of the proposed piscicide treatments, but no reptiles present are known to be fish obligates.

Based on this information FWP would expect the impacts to non-target organisms in the streams proposed for treatment with rotenone to range from non-existent to short term and minor.

Comment 5f: *Terrestrial Organisms:* The following information was extracted from a Biological Recourses Report prepared for Montana Department of Transportation (MDT) which covers the same area as the proposed work for this project (MDT 2014). A search of the Montana Natural Heritage database indicated that eight terrestrial or avian Species of Concern (SOC) could occur within a one mile radius of the proposed project area: great blue heron (*Ardea herodias*), northern goshawk (*Accipiter gentilis*), great gray owl (*Strix nebulosa*), Clark's nutcracker (*Nucifraga columbiana*), veery (*Catharus fuscescens*), Cassin's finch (*Carpodacus cassinii*), and wolverine (*Gulo gulo luscus*). There are 2 federally listed species that may be present in the proposed project area. The grizzly bear (*Ursus arctos horribilis)* and the Canada Lynx *(Lynx canadensis)* are listed Threatened. The wolverine (*Gulo gulo luscus)* is a proposed species for listing under the Endangered Species Act.

Great Blue Heron
The great blue heron is a SOC and has a Montana state rank of S3 and a global rank of G5. It is listed as a Tier III species in the MTFWP *Fish and Wildlife Conservation Strategy*; meaning that the species is either abundant and widespread or believed to have adequate conservation already in place. The great blue heron year-round range covers the western half of Montana and the summer range covers the eastern half of the state. Their habitat varies from urban wetlands to wilderness settings. Nesting colonies mainly occur in cottonwoods along rivers and lakes, a smaller number occur in riparian ponderosa pines and on islands in prairie wetlands. The nests are built high in trees when near rivers and lakes, and on the ground or in shrubs when nesting on treeless islands. Great blue herons are found to be fairly common to common, located in more than 100 nesting colonies across the state. They primarily feed on fish but also amphibians, invertebrates, reptiles, mammals, and birds.

Great blue herons likely feed on fish in French Creek and its tributaries within the project area. Nesting habitat for great blue herons is not present in the project area; however, likely occurs further downstream along the Big Hole River. The removal of fish from French Creek and its tributaries will temporarily eliminate the food supply for great blue herons. However, there are other streams nearby in the Deep Creek drainage that provide very similar foraging habitat for the heron and abundant fish populations. Once French Creek is repopulated with WCT and Arctic grayling, heron foraging opportunities should be equivalent to what was present before restoration.

Northern Goshawk
The northern goshawk is a SOC and has a Montana state rank of S3 and a global rank of G5. It is listed as a Tier II species in the FWP *Fish and Wildlife Conservation Strategy*; meaning that the species is in moderate need of conservation and conservation actions should be implemented. The BLM has listed the northern goshawk as a sensitive species. The Northern Goshawk is a permanent resident in North America and has the widest distribution of the world's 50 species of accipiters. Northern goshawk distribution includes Alaska east to Newfoundland and south throughout much of the western and eastern U.S. Northern goshawks in Montana nest in a variety of forest types including Douglas fir, western larch, lodgepole pine and ponderosa pine.

Northern Goshawks prefer mature and old-growth forests with a predominance of large trees, a dense canopy, and a relatively open understory. Forest stands where Northern Goshawks nest in Montana tend to be mature large-tract conifer forests with a high canopy cover (69%), relatively steep slope (21%); and little to sparse undergrowth (Kirkley 1996). Northern Goshawks hunting and foraging areas are located beneath the forest canopy in dense and open stands and at forest-grassland and forest-shrubland ecotones. During winter in Montana, many birds move to grasslands, shrublands, and valley-bottom riparian areas, where they hunt. Northern Goshawk could occur in the project area during incidental foraging near riparian areas and shrub thickets.

Great Gray Owl

The Great Gray Owl is a SOC and has a Montana state rank of S3 and a global rank of G5. It is listed as a Tier II species in the FWP *Fish and Wildlife Conservation Strategy*; meaning that the species is in moderate need of conservation, and conservation actions should be implemented. The BLM has listed the Great Gray Owl as a sensitive species. The Great Gray Owl is a resident species in Montana, both during the breeding season and in winter. Very little information is known about the migratory patterns of the Great Gray Owl in Montana. The Great Gray Owl's primary habitat in Montana is dense lodgepole pine/Douglas-fir forest types. These are typically located near water. Great Gray Owls forage in wet meadows and coniferous forest in mountainous areas. Great Gray Owls could occur in the project area for incidental foraging in the riparian areas and open grasslands. The Great Gray Owl's primary nesting habitat consisting of dense coniferous forest is located adjacent to the project area. Construction activities will not directly affect any forest stands or potential habitat within the nearby areas of the project area.

Clark's Nutcracker

The Clark's nutcracker is a SOC and has a Montana state rank of S3 and a global rank of G5. It is listed as a Tier III species in the FWP *Fish and Wildlife Conservation Strategy*; meaning that the species is either abundant or widespread or believed to have adequate conservation already in place. Clark's nutcracker is a jay-sized bird that is similar to a crow in build and flight. The Clark's nutcracker has moderate sexual size dimorphism with a total adult length ranging between 27 and 30 cm. These birds are light to medium gray with white around the eyes. The Clark's nutcracker maintains a year-round range through all but the northeast corner of Montana. Their year-round diet consists mostly of pine seeds but can also include insects, spiders, small animals, and carrion. Nutcrackers have a mutualistic relationship with the whitebark pine, as they are the primary agent for their seed dispersal and, in return, the whitebark pine provides one of their primary sources of food. Nesting occurs in Douglas-fir or ponderosa pine stands beginning in late February to mid-April. Egg laying takes place from mid-March to mid-April. Clark's nutcracker is threatened by loss of whitebark pine and ponderosa pines to disease, insect outbreaks and fire. The Clark's nutcracker could occur in the project area as adjacent Douglas-fir and ponderosa pine stands provide nesting and foraging habitat. Whitebark pine is not present in the project area; however it does occur at higher elevations in the nearby mountains.

Veery

The veery is a SOC and has a Montana state rank of S3B and a global rank of G5. It is listed as a Tier II species in the FWP *Fish and Wildlife Conservation Strategy*; meaning that the species is in moderate need of conservation and conservation actions should be implemented. The veery has a reddish brown back, a white belly, and gray flanks and face. It is approximately 18 cm long and maintains a summer residence throughout the entire state of Montana. The earliest arrival date for the veery is April 28, and they typically depart in late August or early September. The veery generally inhabits disturbed damp forests with dense understory. They are also found in willow thickets and cottonwood stands along streams, lakes in valleys and lower mountain canyons. The veery typically forages for food on the ground and consumes insects in the spring and fruits in the late summer and fall. Veeries nest near the ground, utilizing the base of a tree or streamside thickets. These birds are commonly subjected to parasitism by cowbirds and are increasing susceptible to parasitism from habitat fragmentation. The veery is threatened by landscape changes and disturbance that can promote cow bird parasitism. The veery may occur in the project area as general habitat parameters are present.

Cassin’s Finch
The Cassin’s finch is a SOC and has a Montana state rank of S3 and a global rank of G5. It is listed as a Tier III species in the FWP *Fish and Wildlife Conservation Strategy*; meaning that the species is abundant and widespread or believed to have adequate conservation already in place. Cassin’s finch is a large finch that ranges from 14.5 to 15.5 cm in length. Adults display sexual dimorphic features in their plumage; with adult males having red coloration on their head, throat and breast, while females have brown over-all plumage. The Cassin’s finch maintains a year-round residence in western and central Montana and is most commonly found in higher mountain regions. Habitat includes every major forest type and timber-harvest regime in Montana, including riparian cottonwood areas. Cassin’s finch could occur in the project area, as general habitat parameters are located in the area. Primary habitat is not located directly in the project corridor but nearby.

Brewer’s Sparrow
The brewer’s sparrow is a SOC and has a Montana state rank of S3B and a global rank of G5. It is listed as a Tier II species in the FWP *Fish and Wildlife Conservation Strategy*; meaning that the species is in moderate need of conservation, and conservation actions should be implemented. The BLM has listed the brewer’s sparrow as a sensitive species.
Brewer’s sparrow habitat includes sagebrush areas in central and western Montana. The Brewer’s sparrow nesting period ranges from approximately mid-June to mid-July in sagebrush that averages 16 inches in height. Nests are typically found between six to eight inches above the ground. Sagebrush provides necessary nest concealment for the sparrow. The proposed highway route bisects grassland/sagebrush communities that are adequate for Brewer’s sparrow nesting requirements (sagebrush averaging between 12-24 inches in height). The Brewer’s sparrow has been documented in the vicinity of Connor Gulch which is approximately 2 miles downstream of the proposed project area. Brewer’s sparrow may occur within the project area and has primary nesting habitat adjacent to the project area but not within the direct construction area.

Potential Impacts to Terrestrial Wildlife Species of Concern Potential impacts to these species are listed below:

- Direct loss of habitat associated with ground disturbance related to placer mining restoration.
- Noise disturbance associated with construction activities that displaces animals or renders habitat less desirable or unusable.

- Removal of fish could temporarily impact great blue heron foraging in the French Creek drainage.

Potential adverse impacts from proposed construction activities to avian species of concern are expected to be minor and short-term. One of the goals of the placer mining restoration is to enhance riparian habitat. Most of the impacts to bird habitat will occur through an existing or former riparian area, but these impacts should be minor and short term as the new riparian area becomes established. The riparian area in the restored reach will be significantly larger, given the new floodplain, than the riparian area of the existing channel.

Grizzly Bear (Ursus arctos horribilis)

The grizzly bear is listed as a threatened species in the lower 48 states. Five recovery areas have been designated: Yellowstone Ecosystem, Northern Continental Divide Ecosystem, Cabinet-Yaak Ecosystem, Selkirk Ecosystem, and the Northern Cascade Ecosystem. Human-caused mortality and habitat loss are considered to be the primary threats to grizzly bears. The following sections on the grizzly bear provide information that addresses: 1) species description; 2) status and distribution; 3) life history and habitat requirements; 4) reasons for decline; 5) environmental baseline/occurrence in project area; 6) actions/impacts and cumulative effects; 7) recommended conservation and coordination measures; and 8) determination of effect.

Species Description

The grizzly bear is the largest carnivore in Montana. The grizzly bear has a distinctive rounded face with small rounded ears and a prominent nose. The facial profile is concave, and there is a noticeable hump above the shoulders. The claws of adult grizzlies are approximately 4-inches in length and are slightly curved. The color of grizzlies varies greatly, but in Montana the most prevalent coloration is medium to dark brown underfur, with brown legs, hump, and underparts, and light to medium grizzling on the head, back, and a light patch behind the front legs. The size of grizzly bears is variable depending on the season, but the average adult is approximately 72.8 inches long, and the average weight for males is 441 pounds and 287 pounds for females. The grizzly bear is often confused with the more common black bear, but its distinct facial features, shoulder hump, and light colored tips of its fur make differentiation possible at close distances.

Status and Distribution

The grizzly bear is listed as threatened with USFWS, threatened with the USFS, and sensitive with BLM. The grizzly bear is a Montana SOC that has a global rank of G4 and a state rank of S2S3. Grizzly bears historically inhabited most of central and western North America as far south as Mexico, and parts of Eurasia. In North America, the grizzly bear range currently extends from Alaska across the Yukon and Northwest Territory through British Columbia and Alberta to parts of the northwestern U.S. Populations of grizzly bears occurring in the U.S. inhabit six disjunct regions of Washington, Idaho, Montana, and Wyoming. Most individuals that occur in Montana reside in Glacier National Park, the Mission Range, Swan Valley, Swan Mountain Range, Yellowstone Ecosystem, and Bob Marshall Wilderness. Grizzly bears have also been reintroduced to the Cabinet Mountains in northwest Montana.

Life History and Habitat Requirements

Grizzly bears exhibit a long life span of approximately 25 years or more if in captivity. Grizzly bears will breed every 2 to 3 years, with mating season occurring from May through July. Breeding in Montana typically occurs from late April through June or early July. Grizzly bears are polygamous and several males may fight over a female for breeding purposes. Anywhere from one to four cubs are born in the winter den (in Montana the average is 2.8) and weigh on average 1.1 pounds. The newborn cubs are helpless at birth and are nursed for the first 1.5 to 2.5 years, growing rapidly. The young will remain with their mother for the next two winters, and usually achieve adult size in 4 to 6 years. Grizzly bears do not hibernate, but enter a slight torpid state that is described as winter dormancy. Dormancy occurs during denning in well-drained areas on slopes that receive heavy snowfall. The bears will stay up to 7 months in these dens, leaving the dens in March or April.

Grizzly bears are not truly migratory, but often exhibit discrete elevational movements from spring to fall following seasonal food source availability. Grizzly bears usually occur at lower elevations in the spring and at higher elevations in the late summer and into the winter. Grizzly bears have large home ranges averaging 296.5 square miles for males and 48.3 square miles for females, documented in a study conducted in the Swan Mountains of Montana.

Historically, the grizzly bear was primarily a plains species that occurred in high densities throughout most of eastern Montana, but are currently restricted to more remote, forested areas. In Montana, grizzly bears utilize a wide variety of habitat types depending on seasons and local characteristics. These habitats include: meadows, seeps, riparian zones, mixed shrub fields, closed timber, open timber, side-hill parks, snow chutes, and alpine slab-rock. Movements of grizzly bears within their home range are primarily dependent on the availability of food sources. Grizzly bears require large corridors of contiguous forested land for movement within their home range. Den sites typically occur at higher elevations that have a slope of 28 to 35 degrees, with an aspect that maintains deep snow.

Grizzly bears are characterized as opportunistic and adaptable omnivores whose diet consists of greater than 50 percent vegetation. Grizzly bears have long claws for digging and exploiting vegetative food sources, an adaptation that evolved as a result of their diet. Grizzly bears also feed on carrion, fish, large and small mammals, insects, fruit, grasses, bark, roots, mushrooms, and garbage. Whitebark pine seeds are an important dietary component for the grizzly bear. The success of the whitebark pine seed crop exhibits a direct correlation to the number of grizzlies killed in control actions.

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Reasons for Decline

The primary reason for the decline of the grizzly bear in the lower 48 states is the loss of suitable habitat, habitat fragmentation, and extermination of grizzly bears by humans. The presence of motorized vehicles, trains, natural resource extraction, ranching, and recreation can all have a negative impacts on the grizzly bear.

Environmental Baseline/Occurrence in the Project Area

The proposed project does not occur in any of the designated recovery areas. Grizzly bears are not known to frequent the Mount Haggin Wildlife Management Area; however sporadic occurrences of grizzly bears in the general area have been reported historically and recently. Historic records indicate grizzly bear use in the area during the 1920's. More recently, in 2006, a grizzly was recorded in the Mount Haggin WMA and in 2005 an illegal kill of a grizzly bear was documented in the general area of the WMA. The Montana Natural Heritage Program data base also shows grizzly bear use in adjacent Beaverhead and Powell counties. A recent DNA analysis of bear hair collected on the WMA showed all of the hairs to be from black bears, not grizzlies. While it appears that grizzly bear numbers are low and there is no documented occupancy in the general area, due to the wide-ranging nature of grizzly bears it is possible that individuals may travel through or incidentally occur in the project area.

Action/Impacts and Cumulative Effects Analysis

The project is not anticipated to result in long-term adverse impacts to the grizzly bear or to grizzly bear habitat. Construction activities are unlikely to affect grizzly bears. It is concluded that the proposed project implementation will have no significant direct, indirect, or cumulative effects on the grizzly bear and will not result in loss of grizzly bear habitat. During construction, garbage or other substances may attract bears which poses potential harm or a mortality threat to individual bears. Overall the restoration of habitat in the mining impacted reaches of stream and the slopes of Sugarloaf Mountain should improve habitat conditions for grizzly bears and their food sources.

Recommended Conservation and Coordination Measures

Conservation measures designed to avoid and minimize potential impacts to grizzly bears should consist of monitoring of the project area for the presence of the species prior to and throughout the duration of construction activities. The following conservation measures will be implemented for the proposed project:

- To reduce any possible mortality or injury risk to bears or people, use bear-proof containers for garbage and to store other possible attractants such as food and toiletries during construction. A food storage order is in place on the Mt. Haggin WMA.
- Do not feed bears.
- In the event that a grizzly bear is observed within the project area during construction activities, FWP will coordinate with USFWS. Additional conservation measures may be instituted as appropriate.
- Modify construction activities any time the potential of compromising the safety of a grizzly bear is identified. Additional conservation measures may be instituted as appropriate.

Determination of Effect

Dichotomous Key for Making ESA Determination of Effect (USFWS 1998)

1. Are there any proposed/listed plant or animal species and/or proposed/designated critical habitat in the proposed project area?

NO……………………………………………..No Effect

YES……………………………………………Go to 2

2. Will the proposed action(s) have "any effect whatsoever"1 on the species; designated or proposed critical habitat; seasonally or permanently occupied habitat; or unoccupied habitat necessary for the species survival or recovery?

NO……………………………………………..No Effect

YES……………………………………………Go to 3
3. Does the proposed action(s) have potential to: result in "take"2 of any proposed/listed plant or animal species?
NO……………………………………………..Go to 4
YES……………………………………………Likely to adversely affect
4. Does the proposed action(s) have potential to cause an adverse effect to any proposed/listed plant or animal species habitat, such as: adverse effects to critical habitat constituent elements or segments; impairing the suitability of seasonally or permanently occupied habitat; or impairing or degrading unoccupied habitat necessary for the survival or recovery of the species locally?
NO……………………………….………..Not likely to adversely affect
YES………………………………………….Likely to adversely affect

Grizzly Bear
Based on the above information, implementation of recommended conservation measures, analyses of existing conditions and habitat requirements, anticipated project benefits, and the Dichotomous Key for Determination of Effect, it is determined that implementation of the proposed project **may affect** but is **not likely to adversely affect** grizzly bear.

Canada Lynx (*Lynx canadensis*)
Canada lynx identified as a federally-listed threatened species that occurs in Deer Lodge County. After analyses of information on species of concern from Montana Natural Heritage Program and the review of data from USFWS, it was concluded that Canada lynx may potentially pass through the project area. The following sections on the Canada lynx provide information that addresses: 1) species description; 2) status and distribution; 3) life history and habitat requirements; 4) reasons for decline; 5) environmental baseline/occurrence in project area; 6) actions/impacts and cumulative effects; 7) recommended conservation and coordination measures; and 8) determination of effect.

Species Description
Canada lynx is a medium-sized felid. The Canada lynx are typically 22 pounds for the males and 17.5 pounds for the females with an average length of 36.5 inches for males and 35 inches for females. The color of the Canada lynx is yellowish-gray to grayish-brown with a white abdomen and throat. Their bodies are short and compact with long legs and a short tail with an entirely black tip. The back of the ears is darker than the body with a whitish spot in the center with long black tufts off the end. The Canada lynx have a ruff surrounding their face except directly under the snout. This species have large, round, heavily furred feet that are highly adapted for deep snow. The Canada lynx and the bobcat (*Lynx rufus*) are the only two medium-sized felids in Montana. From a distance the Canada lynx and the bobcat may be confused, but are discernible at closer range.

Status and Distribution
Canada lynx populations declined as a result of open season harvests with no bag limit in Montana and Idaho. The populations were so low that the harvest season for the Canada lynx closed in 1999 in Montana and 1997 in Idaho. As of April 24, 2000, the Canada lynx are listed by the USFWS as a threatened species, and are a Montana species of concern with a global ranking of G5 and a state rank of S3. The Canada lynx is distributed across northern North

America from western Alaska to eastern Newfoundland. The distribution and abundance of lynx are closely associated with those of their primary prey species, the snowshoe hare (*Lepus americanus*), and populations cycle with those of the snowshoe hare. Both of these species are generally confined to northern forest environments.

Life History and Habitat Requirements

Canada lynx breed between February and April and give birth following an approximate 62- to 74-day gestation period. The litter size ranges from one to five kittens, and the kittens typically stay with the mother from 9 to 11 months of age. Adult females will produce one litter every 1 to 2 years and the young stay with the mother until the next mating season. Den sites tend to be in mature or old-growth stands with a high density of downed logs. Large woody debris such as downed logs and windfalls provide for den sites with security and thermal cover for kittens. Canada lynx are typically non-migratory animals. However, Canada lynx are known to move large distances when prey becomes scarce. The Canada lynx home range size varies by the animal's gender, abundance of prey, season, and the density of lynx populations. Documented home ranges can vary from 3 to 300 square miles. When snowshoe hares are scarce, Canada lynx may abandon home ranges and wander in search of prey.

Canada lynx typically occur in mesic coniferous boreal, sub-boreal, and western montane forests that are subject to snowy winters and support a prey base of snowshoe hare. Canada lynx are most likely to occur in areas that receive deep snow, for which the lynx is highly adapted. Snowshoe hares use forests with dense understories that provide cover from predators, forage, and protection during extreme weather conditions. Although earlier successional forest stages have greater understory structure and density, mature forests provide habitat for snowshoe hares when trees succumb to disease, fire, or insects. These events create large amounts of deadfall, and suitable habitat for snowshoe hares. The Canada lynx concentrate their hunting activities in habitats where the snowshoe hare activity is high. Most of the Canada lynx occurrences in the Northern Rocky Mountains are in the 4,920- to 6,560-foot elevation range. Populations of Canada lynx in the western U.S. occupy habitat types consisting of logdepole pine, subalpine fir, Engelmann spruce, and quaking aspen. Other habitat types utilized by lynx include: Douglas fir, grand fir (*Abies grandis*), western larch (*Larix occidentalis*), and in extreme northwestern Montana and Idaho, western red cedar (*Thuja plicata*) and western hemlock (*Tsuga heterophylla*).

The Canada lynx forage primarily on snowshoe hares, which comprise approximately 35 to 97 percent of their diet. Another important food source is the red squirrel (*Sciurus vulgaris*), which serves as a primary food source when snowshoe hare populations are reduced. Other food sources include: flying squirrels (*Glaucomys* spp.), ground squirrels (*Spermophilus* spp.), porcupines (*Erethizon dorsatum*), beavers, mice (*Onychomys* spp.), voles (*Microtus* spp.), shrews (*Sorex* spp.), blue grouse (*Dendragapus obscurus*), ruffed grouse *Bonasa umbellus*), and ungulates as prey or carrion. Canada lynx require contiguous habitat with ground and overhead cover for hunting and security. They usually do not cross and tend to avoid large created or natural openings. In winter months, they prefer to forage in spruce-fir forests with high horizontal cover, abundant hares, deep snow, and large-diameter trees. During the summer months, lynx also prefer high-horizontal cover; however, they switch to a higher density of smaller diameter tree that provide shade for rest-sites during the heat of the summer. Canada lynx require either adjacent or contiguous habitat corridors for denning and foraging. Appropriate travel corridors consist of closed canopy regions greater than 6.5 feet in height that are interposed between foraging and denning habitats.

Reasons for Decline

In all regions within the range of Canada lynx in the contiguous United States, timber harvest, recreation, and their related activities are the predominant land use affecting lynx habitat. The primary factor that caused the Canada lynx to be listed was the lack of guidance for conservation of Canada lynx and snowshoe hare habitat in USFS National Forest Land and Resource Plans and BLM Land Use Plans given that a substantial amount of Canada lynx habitat in the contiguous United States is federally managed. This lack of guidance allowed the continued degradation of Canada lynx habitat on Federal lands through timber management and other Federal activities. Causes of mortality in Montana include human activities (trapping or shooting), predation, starvation, and unknown causes.

Environmental Baseline/Occurrence in the Project Area

According the USFWS and correspondence with Montana Natural Heritage Program, the proposed project area is not located within critical habitat for Canada lynx. However, due to its close proximity to sub-alpine, mesic mixed conifer, and woodland forest ecosystems the project area may potentially provide a movement corridor for Canada lynx. The land surrounding the project area is undeveloped forest grasslands managed by FWP, USFS and BLM. Canada lynx require contiguous habitat with ground and overhead cover in montane forests, therefore the immediate project area does not contain suitable habitat. Canada lynx may have potential incidental occurrences within the project area; however, lynx surveys conducted between 1999 and 2001 within the Beaverhead-Deerlodge National Forest detected no lynx. From 2001 to 2005, 11,220 miles of winter snow-tracking surveys and trap route checks on the Beaverhead-Deerlodge National Forest detected no verified lynx tracks. Additional surveys also failed to detect any lynx and it was concluded that most of the Beaverhead-Deerlodge National Forest was not suitable lynx habitat. These data suggest that Canada lynx are unlikely to occur in the project area, however due to the project's proximity to undeveloped forest lands there is the potential for incidental movement through the project area.

Action/Impacts and Cumulative Effects Analysis

Canada lynx have specific habitat requirements consisting of continuous forested areas with dense understory vegetation. These specifications exist within and adjacent to the immediate project area. However, data indicate that their presence is unlikely. It is concluded that the proposed project will have no significant direct, indirect, or cumulative effects on the Canada lynx.

Recommended Conservation and Coordination Measures

Conservation measures designed to avoid and minimize potential impacts to Canada lynx should consist of monitoring of the project area for the presence of the species prior to and throughout the duration of construction activities. In the event that a Canada lynx is observed within the project area during project construction activities, FWP will contact USFWS for instruction. If present in the project area, restrictions on certain construction activities or areas of limited access may be recommended.

Determination of Effect

Dichotomous Key for Making ESA Determination of Effect (USFWS 1998)

1. Are there any proposed/listed felid species and/or proposed/designated critical habitat in the proposed project area?

NO……………………………………………..No Effect

YES……………………………………………Go to 24.2.3. See comment 5g for minor potential impacts.

2. Will the proposed action(s) have "any effect whatsoever" on the species; designated or proposed critical habitat; seasonally or permanently occupied habitat; or unoccupied habitat necessary for the species survival or recovery?

NO……………………………………………..No Effect

YES……………………………………………Go to 3

3. Does the proposed action(s) have potential to: result in "take" of any proposed/listed felid species?

NO……………………………………………..Go to 4

YES……………………………………………Likely to adversely affect

4. Does the proposed action(s) have potential to cause an adverse effect to any proposed/listed felid species habitat, such as: adverse effects to critical habitat constituent elements or segments; impairing the suitability of seasonally or permanently occupied habitat; or impairing or degrading unoccupied habitat necessary for the survival or recovery of the species locally?

NO…………………………….……………Not likely to adversely affect

YES………………………………………...Likely to adversely affect

Based on multiple surveys that failed to detect Canada lynx within the Beaverhead-Deer Lodge National Forest, implementation of recommended conservation measures, analyses of existing conditions and habitat requirements, it is determined that implementation of the proposed project will have ***no effect*** on the Canada lynx.

Wolverine (*Gulo gulo luscus*)

The wolverine is identified as a proposed species for listing under the Endangered Species Act that occurs in Deer Lodge County. After analyses of information on species of concern from Montana Natural Heritage Program and the review of data from USFWS, it was concluded that the wolverine may potentially be affected by the proposed project. The following sections on the wolverine provide information that addresses: 1) species description; 2) status and distribution; 3) life history and habitat requirements; 4) reasons for decline; 5) environmental baseline/occurrence in project area; 6) actions/impacts and cumulative effects; 7) recommended conservation and coordination measures; and 8) determination of effect.

Species Description

The wolverine is the largest mustelid in Montana. Wolverines are similar to fishers, but are approximately twice as large. This species resembles a small bear and has a compact body, broad head, short neck and legs, and a bushy tail. Adult males range in size from 3 to 3.5 feet in length and can weigh between 15 and 70 pounds. Adult females are typically ten percent less in length and thirty percent less in weight.

Status and Distribution
On February 4, 2013, the USFWS proposed the wolverine for listing as a threatened species under ESA. It is a Montana species of concern with a state rank of S3 and has a global rank of G4. The wolverine is designated as a USFS and BLM sensitive species. The wolverine is comprised of two holartic subspecies, with *G. g. luscus* occurring in North America and *G. g. gulo* occurring in Europe and Asia. In North America, *G. g. luscus* is common in northwestern Canada and in Alaska. Populations in the continental US are found in Washington, Oregon, Idaho, California, Utah, Colorado, Wyoming, and Montana. It is presumed extirpated in the Midwest, Northeast, and Nevada. Montana and Idaho are the only states in the continental U.S. that are thought to have any significant populations of wolverines.

Life History and Habitat Requirements
The wolverine prefers a variety of coniferous montane forest types in Montana composed of scattered mature timber. Wolverines prefer rugged, roadless, and wilderness habitat conditions. Breeding season for the wolverines extends from June to August. Dens usually occur among rocks or tree roots, a hollow log, a fallen tree or in dense vegetation. Persistent, stable snow greater than five feet deep appears to be a requirement for denning, because it provides security for offspring and buffers cold winter temperatures. Wolverines are opportunistic feeders, consuming a wide variety of food such as roots, berries, small mammals, bird eggs, young fledglings, and fish. Food may be cached in the fork of tree branches or under the snow. Wolverines occur in relatively low densities and are solitary and wide ranging. Home ranges of males are larger than for females and can extend for several hundred square miles.

Reasons for Decline
Over-harvesting by trappers in the early twentieth century and poisoning programs are thought to be the main reasons for historic declines of wolverines. Global warming over the next century is likely to significantly reduce wolverine habitat. Human-caused mortality, caused by incidental trapping take may be an additional threat.

Environmental Baseline/Occurrence in the Project Area
Montana Natural Heritage Program records show historic sightings (1940-1960) of wolverines in the mountainous regions around the project area. No recent sightings have been recorded. Denning habitat does not exist in the project area. Wolverines are wide-ranging animals. It is possible that they may incidentally occur or be transient in the area.

Action/Impacts and Cumulative Effects Analysis
Construction-related noise and activities could disrupt wolverines causing individuals to avoid a zone around the project. Due to the general terrain, wolverines have numerous options to navigate around the disturbance zone so that project would not impede large scale movement of wolverines. The restoration of vegetation in upland and riparian areas as a result of the proposed project may benefit wolverines and/or their prey.

Recommended Conservation and Coordination Measures
Conservation measures designed to avoid and minimize potential impacts to the wolverine are provided below:

- In the event that the wolverine is observed within the project area during construction activities, FWP will coordinate with USFWS. Additional conservation measures may be instituted as appropriate.

Determination of Effect

Because the project area is located in an area with low or incidental wolverine use, the proposed activities will not result in loss of denning habitat, and the increased risk of mortality to the wolverine is negligible and insignificant, it is determined that implementation of the proposed project ***is not likely to jeopardize the continued existence*** of the wolverine

Aquatic organisms:

Westslope Cutthroat Trout

WCT is a SOC and has a Montana state rank of S2 and global rank of G4T3. It is listed as a Tier I species in the FWP *Fish and Wildlife Conservation Strategy*; meaning that the species is in the greatest conservation need. The US Forest Service Region 1 Regional Forester has designated the westslope cutthroat trout as sensitive on the Beaverhead-Deer Lodge National Forest. The BLM has designated this species as a sensitive species in Montana. A small portion of the project area occurs on BLM administered lands. The factors affecting WCT have been described previous and will not be restated here. The intent of the proposed project is to restore WCT to more than 40 miles of stream in the French Creek drainage and to conserve one remaining aboriginal population of WCT in American Creek. There are no anticipated negative impacts to WCT by the proposed action. Once non-native fish are removed, non-hybridized WCT will be reintroduced to French Creek and its tributaries. French Creek will represent the largest WCT population in the Big Hole and the second largest in the upper Missouri River.

Arctic Grayling

Arctic grayling is a SOC and has a Montana state rank of S1 and global rank of G5. It is listed as a Tier I species in the FWP *Fish and Wildlife Conservation Strategy*; meaning that the species is in the greatest conservation need. The US Forest Service Region 1 Regional Forester has designated the Arctic grayling as sensitive on the Beaverhead-Deer Lodge National Forest. The species was petitioned for listing under the Endangered Species Act and was a candidate species for several years. In 2014 the USFSW determined that listing the Arctic grayling was not warranted at this time and a lawsuit was filed shortly after objecting to the decision. The factors affecting grayling have been described previously and will not be restated here. The intent of the proposed project is to restore grayling to more than 40 miles of stream in the French Creek drainage. The fish barrier will impede upstream fish passage in French Creek which may have an impact on fluvial populations in the Big Hole and/or Deep Creek that may use French Creek for spawning, rearing or for seasonal adult habitat. However, recent surveys did not find any evidence that grayling use French Creek seasonally or for spawning and rearing. Therefore, the impact of the barrier structure on grayling in the Big Hole and/or Deep Creek would be negligible. Further, there is abundant, high quality habitat in Deep Creek for spawning, rearing and seasonal use by adult fish. Once non-native fish are removed, Arctic grayling from the Big Hole drainage will be reintroduced to French Creek and its tributaries. It is unclear if the introduced grayling will establish a resident population in French Creek. Generally the use of grayling of tributary streams such as French Creek has been for spawning and rearing and for seasonal refuge from warm water temperatures in the mainstem Big Hole River. However, restoration efforts in the Ruby River drainage suggest that introduced grayling can establish resident populations in suitable habitats. Regardless, if grayling establish a self-sustaining resident population or not, the impacts of the proposed project on existing grayling are anticipated to be minimal and the potential for positive impacts on grayling in the Big Hole are substantial.

Western Pearlshell Mussels

The western pearlshell (*Margaritifera falcata*) mussel has a Montana state rank of S2 and a global rank of G4G5. It is listed as a Tier I species in the FWP *Fish and Wildlife Conservation Strategy*, meaning that the species is in the greatest conservation need and has been recently designated (2011) as a USFS Region 1 Sensitive Species. The western pearlshell's shell is elongate and dark colored with a pink-purplish inside (nacre); adults typically range from 50 to 85 mm with old individuals exceeding 100 mm. Adults are sedentary and rarely move more than a few meters throughout their lives. While in the larval stage, the western pearlshell must briefly parasitize a host fish in order to complete its development. This type of parasitism also functions as a dispersal technique, by transporting larval mussels by way of the host fish up or downstream to new habitats. In Montana, the preferred native host fish is the westslope cutthroat trout, but western pearlshell have been documented to use bull trout, brook trout and rainbow trout. Western pearlshell mussels are generally found in cold running streams that have a low to moderate gradient and stable gravel substrates. Food sources include particulate organic materials in the water column. Stream habitat degradation such as dewatering, sedimentation, siltation, pollution and damming or diversions is the main cause of decline for the western pearlshell. Due to its dependence on its host fish species, threats to the specific host trout species and habitat are also potential threats to the mussel.

The western pearlshell is Montana's only cold water trout stream mussel and is found on both sides of the Continental Divide. It occurs along the western coastal states and provinces from Alaska to California, and in Wyoming and Montana. The western pearlshell mussel is regionally uncommon, however it can be locally common. In Montana, it is in serious decline and at risk statewide, especially populations in the Upper Missouri River. Within the Upper Missouri River Basin, tributaries to the Beaverhead and Big Hole (Bloody Dick, Deep Creek, and Clam Creek) and upper Madison Rivers hold viable populations.

Project Occurrence

Western pearlshell mussels occur in French Creek and in several locations more than two miles downstream in Deep Creek. The populations identified within the project area are listed as non-viable with no reproduction or with a fair population density (<25 individuals per 50m) but still no juveniles present. Evidence of limited reproduction was noted in the 2013 when one juvenile mussel (4 cm) was found in an 800 ft reach of stream in the project area. With no or limited reproduction these populations are not likely to persist into the future. The population near French Gulch's confluence with California Creek has a ranking of "D viability" meaning that the population consists of very low numbers of older individuals and will not persist 25 years from present.

Populations downstream in Deep Creek are ranked as “A viability” indicating that they have excellent viability, > 50 individuals per 50m, a full range of age classes with reproduction occurring and juveniles present. Host fish species (brook trout, rainbow trout and westslope cutthroat trout) for the parasitic larval portion of the western pearlshell mussel life cycle occur in good densities in both French and Deep Creeks.

Potential Impacts

Impact assessment was based on draft protocol used by USFS Region 1. In this protocol, a population is generally considered to be a group or grouping of western pearlshell mussels in close area. Viability assessments are made for the individual populations. Project-related impacts to the western pearlshell mussel primarily fall into three categories:

- Smothering caused by increased sedimentation and siltation,
- Direct disturbance of mussel beds resulting in death of mussels, and
- Stress or death of mussels stranded from temporary or permanent water diversions during construction and reclamation.

In general, there is the potential for temporary increased sedimentation in French Creek during construction and for a period of time after construction even with usual sediment control measures. Sediment releases could be substantial during channel work in Moose and French creeks and in French Gulch. Sediment release due to construction activity will be short-term and temporary and is likely to decrease overtime as disturbed ground stabilizes. Ultimately, long-term sediment loading to these streams is anticipated to be dramatically reduced as a result of the proposed restoration activities.

Western pearlshell mussels are sensitive to sedimentation and siltation. While thresholds are not known for these mussels, research indicates that western pearlshell mussels smothered by 5 cm (~ 2 inches) of sedimentation experienced 10-20% mortality (Vaugh and Taylor 1999 in Stagliano 2010). It is likely that at least a portion of a western pearlshell population below a culvert removal or channel alteration (or similar project) will suffer mortality from elevated sediment (or direct disturbance), if they are not translocated (Personal communication, Stagliano 2013).

Known populations of western pearlshell mussels in the project area occur at locations that are in close proximity to activities that could cause a plume of sediment and, as a result, are at risk of being smothered. Additionally, the increase in general sediment in French Creek over the course of the project may cause further stress on these already compromised populations. Instream work associated with the activities near the two population sites could directly disturb mussels or mussel beds. The relocation of the stream channel in French Gulch and French Creek may inadvertently leave the mussel populations stranded without water and detrimentally affect them.

Western pearlshell mussels populations located downstream in Deep Creek and lower French Creek, outside of the project area, are likely to be unaffected by increased sedimentation. It is assumed that in the distance of over 2 stream miles much of the increased sedimentation that was released into French Creek would settle out before reaching the downstream populations of western pearlshell mussels. The fish barrier will also act as a sediment basin and greatly reduce fine sediments downstream into lower French Creek and Deep Creek where there are viable mussel populations.

An additional western pearlshell mortality concern related to French Creek is the piscicide (rotenone) treatment. Freshwater mussels tend to have a much higher tolerance to rotenone than fish or other aquatic invertebrates (Hart et al. 2001). Experiments conducted in the West Fork Mudd Creek in 2013 suggest that pearlshell mussels do not demonstrate an acute (24 or 72 hr) response to rotenone treatment at 1 ppm that was adequate to remove brook trout (Olsen 2013 unpl. data). Although no mortality is anticipated through the application of rotenone to French Creek the limited population size and vulnerable nature of the mussel population may warrant additional protection measures to ensure that remaining mussels are conserved.

Avoidance, Minimization and Conservation Measures

Due to the variety of potential mortality hazards to the mussel populations of French Creek, it has been recommended by the Natural Heritage Program to translocate individual mussels present in French Creek to similar habitat out of the affected area. Translocations optimally would occur late-July to September when reproductive stress is low and metabolic rate sufficient for effective re-burrowing into the substrate. This could be considered a long-term (>1 year) relocation and may be permanent. Due to the uncertainty of potential sedimentation levels and distribution, we would consider conducting sediment monitoring following accepted protocols during and after construction (for at least 2 – 5 years) to determine extent and impact of increased sedimentation to western pearlshells from construction-related activities. It is anticipated that once habitat conditions have improved and non-native fish have been removed, that the translocated mussel would be returned to French Creek. Once native fish are restored and habitat conditions improve in French Creek, it is anticipated that the mussel population will increase.

Impact Assessment

Because of the likelihood of an increase in sediment (primarily acute and short-term near populations) in French Creek from the proposed habitat restoration work and the treatment with rotenone, it was determined that implementation of the proposed actions would adversely impact enough individuals or their habitat with a consequence contributing to a loss of viability to the western pearlshell populations in French Creek that are within the project area. Therefore, this translocation effort prior to construction was suggested to mitigate imminent impacts that would potentially adversely affect the mussel populations. Since the western pearlshell mussel populations in Deep Creek and lower French Creek are greater than 2 river miles from the project area, and that increases in sediment in French Creek are likely to settle out before reaching these populations, it is determined that implementation of the proposed activities may impact individuals or habitat, but will not likely contribute to the loss of viability to these populations.

Comment 5g. There is the potential for displacement of some animals during the implementation of this project (see Comment 5f). Mule deer, elk, other big game species and species mentioned above (Comment 5f) may be temporarily displaced as crews are present in the drainages performing the proposed work. However, these impacts should only be minor and temporary. No long-term negative impacts to wildlife populations and positive impacts are anticipated as habitat is restored.

Comment 5i: Westslope cutthroat trout and Arctic grayling were historically present in the French Creek drainage. Only one small population of WCT remains in the headwaters of American Creek and no grayling are present today in French Creek. The intent of this project is to restore these native species to the stream.

Cumulative Impacts: Impacts to fish and wildlife from the proposed action would be short term and minor. FWP does not expect the proposed action to result in other actions that would create cumulative impacts to fish and wildlife resources within the proposed restoration streams. FWP does not foresee any other activities in the basin that would add to impacts of the proposed action. As such there are no cumulative impacts to non-target organisms related to construction and the treatment of the proposed streams.

B.HUMAN ENVIRONMENT

6. NOISE/ELECTRICAL EFFECTS **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Increases in existing noise levels?			X		No	6a
b. Exposure of people to serve or nuisance noise levels?			X		Yes	6b
c. Creation of electrostatic or electromagnetic effects that could be detrimental to human health or property?		X				
d. Interference with radio or television reception and operation?		X				

Comment 6a: The presence of large machinery in the French Creek drainage to construct the fish barrier, restore placer mined streams and restore the slopes of Sugarloaf Mountain will result in increased noise generation. Construction work in the drainage will occur from May through November as conditions allow.

Comment 6b. There are no residences located adjacent to proposed construction areas. There are 2 residences within 1 mile of the proposed barrier location; however, neither of these is within eyesight of the fish barrier. Therefore, there is only anticipated to be minimal noise generation that could be considered nuisance at these locations.

Cumulative Impacts: Increases in noise from the proposed action would be short term and minor. FWP does not expect the proposed action to result in other actions that would create increased noise in the streams or drainages proposed for restoration. FWP does not foresee any other activities in the basin that would add to impacts of the proposed action. As such there are no cumulative impacts related to noise from the proposed treatment of the proposed streams with piscicides or associated barrier construction.

7. LAND USE **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Alteration of or interference with the productivity or profitability of the existing land use of an area?		X				
b. Conflicted with a designated natural area or area of unusual scientific or educational importance?		X				
c. Conflict with any existing land use whose presence would constrain or potentially prohibit the proposed action?			X			See 7c
d. Adverse effects on or relocation of residences?		X				

Comment 7c: During treatment with rotenone and when construction is occurring in placer mined reaches of stream, public access to these areas would be closed to reduce public risk. The length of the closure would depend on the amount of time activities are occurring in each stream. Streams closed for public access during the rotenone treatment would be reopened within 2 to 4 days. The treatment would be implemented in late summer (July-September). At proposed treatment levels, stream water would not be toxic to wildlife or livestock. However, to limit any potential conflict, the treatment would be coordinated such that livestock are pastured elsewhere or livestock would be temporarily moved to adjacent pastures during the treatment period if possible.

Cumulative Impacts: Impacts on land use from the proposed action would be short term and minor. FWP does not expect the proposed action to result in other actions that would impact land use in the proposed WCT restoration streams. We do not foresee any other activities in the basin that would add to impacts of the proposed action. As such there are no cumulative impacts related to land use from the proposed project.

8. RISK/HEALTH HAZARDS Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Risk of an explosion or release of hazardous substances (including, but not limited to oil, pesticides, chemicals, or radiation) in the event of an accident or other forms of disruption?			X		YES	8a
b. Affect an existing emergency response or emergency evacuation plan or create a need for a new plan?			X		YES	8b
c. Creation of any human health hazard or potential hazard?			X		YES	see 8a,c
d. Will any chemical toxicants be used?			X		YES	see 8a

Comment 8a: There is a minor risk of oil or fuel being spilled from heavy machinery that would be used to restore mining impacts in the drainage and construct the fish barrier. A fueling location will likely be established by the contractor performing the proposed work. This location will be fitted with appropriate fuel containment devices in the event of a spill as per the engineer's technical project specifications. It is possible that ruptured line or tank could also spill oil or fuel. Machinery will be inspected prior to mobilization and any leaks will be fixed. In the event that a leak is discovered that equipment would be evaluated and the leak fixed.

The principal risk of human exposure to hazardous materials from this project would be limited to the applicators of rotenone. All applicators would wear safety equipment required by the product label and MSDS sheets. Such safety equipment may include respirator, goggles, rubber boots (waders), Tyvek overalls, and Nitrile gloves. All applicators would be trained on the safe handling and application of the piscicide. At least one Montana Department of Agriculture certified pesticide applicator would supervise and administer the project. Materials would be transported, handled, applied and stored according to the label specifications to reduce the probability of human exposure or spill. See also Comment 8c for other review of risks to general public.

Comment 8b: FWP requires a treatment plan for native fish restoration projects. This plan addresses many aspects of safety for people who are on the implementation team such as establishing a clear chain of command, training, delegation and assignment of responsibility, clear lines of communication between members, a spill contingency plan, first aid, emergency responder information, personal protective equipment, monitoring and quality control, among others. Implementing this project should not have any impact on existing emergency plans. Because an implementation plan has been developed by FWP the risk of emergency response is minimal and any affects to existing emergency responders would be short term and minor.

Comment 8c: The EPA (2007) conducted an analysis of the human health risks for rotenone and concluded it has a high acute toxicity for both oral and inhalation routes, but has a low acute toxicity for dermal route of exposure. It is not an eye or skin irritant nor a skin sensitizer. The EPA could not provide a quantitative assessment of potentially critical effect on neurotoxicity risks to rotenone users, so a number of uncertainty factors were assigned to the rating values. They are; an additional 10x database uncertainty factor - in addition to the inter-species (10x) uncertainty factor and intra-species (10x) uncertainty factor – has been applied to protect against potential human health effects and the target margin of exposure (MOE) is 1000. The following table summarizes the EPA toxicological endpoints of rotenone (from EPA 2007);

Exposure Scenario	**Dose Used in Risk Assessment, Uncertainty Factor (UF)**	**Level of Concern for Risk Assessment**	**Study and Toxicological Effects**
Acute Dietary (females 13-49)	NOAEL = 15 mg/kg/day UF = 1000 aRfD = 15 mg/kg/day = 0.015 mg/kg/day 1000	Acute PAD = 0.015 mg/kg/day	Developmental toxicity study in mouse (MRID 00141707, 00145049) LOAEL = 24 mg/kg/day based on increased resorptions
Acute Dietary (all populations)	An appropriate endpoint attributable to a single dose was not identified in the available studies, including the developmental toxicity studies.		
Chronic Dietary (all populations)	NOAEL = 0.375 mg/kg/day UF = 1000 cRfD = 0.375 mg/kg/day = 0.0004 mg/kg/day 1000	Chronic PAD = 0.0004 mg/kg/day	Chronic/oncogenicity study in rat (MRID 00156739, 41657101) LOAEL = 1.9 mg/kg/day based on decreased body weight and food consumption in both males and females
Incidental Oral Short-term (1-30 days) Intermediate-term (1-6 months)	NOAEL = 0.5 mg/kg/day	Residential MOE = 1000	Reproductive toxicity study in rat (MRID 00141408) LOAEL = 2.4/3.0 mg/kg/day [M/F] based on decreased parental (male and female) body weight and body weight gain
Dermal Short-, Intermediate-, and Long-Term	NOAEL = 0.5 mg/kg/day 10% dermal absorption factor	Residential MOE = 1000 Worker MOE = 1000	Reproductive toxicity study in rat (MRID 00141408) LOAEL = 2.4/3.0 mg/kg/day
Inhalation Short-term (1-30 days) Intermediate-term (1-6 months)	NOAEL = 0.5 mg/kg/day 100% inhalation absorption factor	Residential MOE = 1000 Worker MOE = 1000	[M/F] based on decreased parental (male and female) body weight and body weight gain
Cancer (oral, dermal, inhalation)	Classification; No evidence of carcinogenicity		

UF = uncertainty factor, NOAEL = no observed adverse effect level, LOAEL = lowest observed adverse effect level, aPAD = acute population adjusted dose, cPAD = chronic population adjusted does, RfD = reference dose, MOE = margin of exposure, NA = Not Applicable

Rotenolenoids are common degradation products found in the parent plant material used to make piscicidal forms of rotenone. The EPA (2007) concluded these degradation products are no more toxic than the active ingredient.

The EPA analysis of acute dietary risk for both food and drinking water concluded;

> *"…When rotenone is used in fish management applications, food exposure may occur when individuals catch and eat fish that either survived the treatment or were added to the water body (restocked) prior to complete degradation. Although exposure from this route is unlikely for the general U.S. population, some people might consume fish following a rotenone application. EPA used maximum residue values from a bioaccumulation study to estimate acute risk from consuming fish from treated water bodies. This estimate is considered conservative because the bioaccumulation study measured total residues in edible portions of fish including certain non-edible portions (skin, scales, and fins) where concentrations may be higher than edible portions (tissue) and the Agency assumed that 100% of fish consumption could come from rotenone exposed fish. In addition, fish are able to detect rotenone's presence in water and, when possible, attempt to avoid the chemical by moving from the treatment area. Thus, for partial kill uses, surviving fish are likely those that have intentionally minimized exposure.*
>
> *Acute exposure estimates for drinking water considered surface water only because rotenone is only applied directly to surface water and is not expected to reach groundwater. The estimated drinking water concentration (EDWC) used in dietary exposure estimates was 200 ppb, the solubility limit of rotenone. The drinking water risk assessment is conservative because it assumes water is consumed immediately after treatment with no degradation and no water treatment prior to consumption.*
>
> *Acute dietary exposure estimates result in dietary risk below the Agency's level of concern. Generally, EPA is concerned when risk estimates exceed 100% of the acute population adjusted dose (aPAD). The exposure for the "females 13-49 years old" subgroup (0.1117 mg/kg/day) utilized 74% of the aPAD (0.015 mg/kg/day) at the 95th percentile (see Table 5). It is appropriate to consider the 95th percentile because the analysis is deterministic and unrefined. Measures implemented as a result of this RED will further minimize potential dietary exposure (see Section IV)..."*

As for evaluating the human chronic risk from exposure to rotenone treated water, the EPA acknowledges the four principle reasons for concluding there is a low risk: first, the rapid natural degradation of rotenone, second, using active detoxification measures by applicators such as potassium permanganate, third, properly following piscicide labels and the extra precautions stated in this document and finally, proper signing, public notification or area closures which limit public exposure to rotenone treated water.

As for recreational exposure, the EPA concludes no risk to adults who enter treated water following the application by dermal and incidental ingestion, but requires a waiting period of 3 days after a treatment before toddlers swim in treated water. The aggregate risk to human health from food, water and swimming does not exceed the EPA level of concern (EPA 2007).

Recreationists in the area would likely not be exposed to the treatments because treatment areas would be closed to public access. Signs would be in place to warn recreationists that the streams are being treated with rotenone and closed to entry. Proper warning through news releases, signing the project area, temporary road closure and administrative personnel in the project area should be adequate to keep recreationists from being exposed to any treated waters.

Fisher (2007) conducted an analysis of the inert constituent ingredients found in the rotenone formulation of CFT Legumine for the California Department of Fish and Game. These inert ingredients are principally found in the emulsifying agent Fennodefo[99] which helps make the generally insoluble rotenone more soluble in water. The constituents were considered because of their known hazard status and not because of their concentrations in the Legumine formulation. Solvents such as xylene, trichloroethylene (TCE) and tetrachloroethylene are residue left over from the process of extracting rotenone from the root and can be found in some lots of Legumine. However, inconsistent detectability and low occurrence in other formulations that used the same extraction process were below the levels for human health and ecological risk. Solvents such as toluene, n-butylbenzene, 1,2,4 trimethylbenzene and naphthalene are present in Legumine, and when used in other applications can be an inhalation risk. However, because of their low concentrations in this formulation, the human health risk is low. The remaining constituents, the fatty acid esters, resin acids, glycols, substituted benzenes, and 1-hexanol were likewise present but either analyzed, calculated or estimated to be below the human health risk levels when used in a typical fish eradication project.

Methyl pyrrolidone is also found in Legumine. It is known to have good solvency properties and is used to dissolve a wide range of compounds including resins (rotenone). Analysis of Methyl pyrrolidone in Legumine showed it represents about 9% of the formulation (Fisher 2007). The analysis concluded regarding the constituent ingredients in Legumine;

> "…None of the constituents identified are considered persistent in the environment nor will they bioaccumulate. The trace benzenes identified in the solvent mixture of CFT Legumine™ will exhibit limited volatility and will rapidly degrade through photolytic and biological degradation mechanisms. The PEGs are highly soluble, have very low volatility, and are rapidly biodegraded within a matter of days. The fatty acids in the fatty acid ester mixture (Fennodefo99™) do not exhibit significant volatility, are virtually insoluble, and are readily biodegraded, although likely over a slightly longer period of time than the PEGs in the mixture. None of the new compounds identified exhibit persistence or are known to bioaccumulate. Under conditions that would favor groundwater exchange the highly soluble PEGs could feasibly transmit to groundwater, but the concentrations in the reservoir, and the rapid biodegradation of these constituents makes this scenario extremely unlikely. Based upon a review of the physicalchemistry of the chemicals identified, we conclude that they are rapidly biodegraded, hydrolyzed and/or otherwise photolytically oxidized and that the chemicals pose no additional risk to human health or ecological receptors from those identified in the earlier analysis. None of the constituents identified appear to be at concentrations that suggest human health risks through water, or ingestion exposure scenarios and no relevant regulatory criteria are exceeded in estimated exposure concentrations…"

The Legumine MSDS states "…when working with an undiluted product in a confined space, use a non-powered air purifying respirator…and… air-purifying respirators do not protect workers in oxygen-deficient atmospheres…" It is not likely that workers would be handling Legumine in an oxygen deficient space during normal use. However, to guard against this, proper ventilation and safety equipment would be used according to the label requirements.

In their description of how South American Indians prepare and apply *Timbó*, a rotenone parent plant, Teixeira, et al. (1984) reported that the Indians extensively handled the plants during a mastication process, and then swam in lagoons to distribute the plant pulp. No harmful effects were reported. It is important to note that the primitive method of applying rotenone from root does not involve a calculated target concentration, metering devices or involve human health risk precautions as those involved with fisheries management programs.

One study, in which rats were injected with rotenone for a period of weeks, reported finding lesions characteristic of Parkinson's disease (Betarbet et al. 2000). However, the relevance of the results to the use of rotenone as a piscicide have been challenged based upon the following dissimilarities between the experimental methodology used and fisheries related applications: (1) the continuous intravenous injection method used to treat the rats leads to "continuously high levels of the compound in the blood," unlike field applications where 1) the oral route is the most likely method of exposure, 2) a much lower dose is used and 3) potential exposure to rotenone is limited to usually only a matter of days because of the rapid breakdown of the rotenone following application. Further, dimethyl sulfoxide (DMSO) was used to enhance tissue penetration in the laboratory experiment (normal routes of exposure actually slow introduction of chemicals into the bloodstream), no such chemicals enhancing tissue penetration are present in the rotenone formulation proposed for use in this treatment. Similar studies (Marking 1988) have found no Parkinson-like results. Extensive research has demonstrated that rotenone does not cause birth defects (HRI 1982), gene mutations (Van Geothem et al. 1981; BRL 1982) or cancer (Marking 1988). Rotenone was found to have no direct role in fetal development of rats that were fed high concentrations of rotenone. Spencer and Sing (1982) reported that rats that were fed diets laced with 10-1,000 ppm rotenone over a 10 day period did not suffer any reproductive dysfunction. Typical concentrations of actual rotenone used in fishery management range from 0.025 to 0.50 ppb and are far below that administered during most toxicology studies.

A recent study linked the use of rotenone and paraquat with the development of Parkinson's disease in humans later in life (Tanner et al. 2011). The after-the-fact study included mostly farmers from 2 states within the United States who presumably used rotenone for terrestrial application to crops and/or livestock. Rotenone is no longer approved for agricultural uses and is only approved for aquatic application as a piscicide. The results of epidemiological studies of pesticide exposure, such as this one have been highly variable (Guenther et al. 2011). Studies have found no correlations between pesticide exposure and PD (e.g., Jiménez-Jiménez 1992; Hertzman 1994; Engel et al. 2001; Firestone et al. 2010), some have found correlations between pesticide exposure and PD (e.g., Hubble et al. 1993; Lai et al. 2002; Tanner et al. 2011) and some have found it difficult determine which pesticide or pesticide class is implicated if associations with PD occur (e.g., Engel et al. 2001; Tanner et al. 2009). Recently, epidemiological studies linking pesticide exposure to PD have been criticized due to the high variation among study results, generic categorization of pesticide exposure scenarios, questionnaire subjectivity, and the difficulty in evaluating the causal factors in the complex disease of PD, which may have multiple causal factors (age, genetics, environment) (Raffaele et al. 2011). A specific concern is the inability to assess the degree of exposure to certain chemicals, including rotenone, particularly the concentration of the chemical, frequency of use, application (e.g., agricultural, insect removal from pets), and exposure routes (Raffaele et al. 2011). No information is given in the Tanner et al. (2011) study about the formulation of rotenone used (powder or liquid) or the frequency or dose farmers were exposed to during their careers. There is also no information given about the personal protective equipment used or any information about other pesticides farmers were exposed to during the period of the study. It is also unclear in the Tanner et al. (2011) study the frequency and the dose individuals were exposed to during the time period of use. Without information on how much rotenone individuals were exposed to and for how long, it is difficult to evaluate the potential risk to humans of developing Parkinson's disease from aquatic applications of rotenone products.

The state of Arizona conducted an exhaustive review to the risks to human health of rotenone use as a piscicide (Guenther et al. 2011). They concluded: "To date, there are no published studies that conclusively link exposure to rotenone and the development of clinically diagnosed PD. Some correlation studies have found a higher incidence of PD with exposure to pesticides among other factors, and some have not. It is very important to note that in case-control correlation studies, causal relationships cannot be assumed and some associations identified in odds-ratio analyses may be chance associations. Only one study (Tanner et al. 2011) found an association between rotenone and paraquat use and PD in agricultural workers, primarily farmers. However, there are substantial differences between the methods of application, formulation, and doses of rotenone used in agriculture and residential settings compared with aquatic use as a piscicide, and the agricultural workers interviewed were also exposed to many other pesticides during their careers. Through the EPA reregistration process of rotenone, occupational exposure risk is minimized by: new requirements that state handlers may only apply rotenone at less than the maximum treatment concentrations (200 ppb), the development of engineering controls to some of the rotenone dispensing equipment, and requiring handlers to wear specific PPE."

It is clear that to reduce or eliminate the risk to human health, including any potential risk of developing Parkinson's disease, public exposure to rotenone treated water must be eliminated to the extent possible. To reduce the potential for exposure of the public during the proposed use of rotenone to restore WCT, areas treated with rotenone would be closed to public access during the treatment. Signs would be placed at access points informing the public of the closure and the presence rotenone treated waters. Personnel would be onsite to inform the public and escort them from the treatment area should they enter. Rotenone treated waters would be contained to the proposed treatment areas by adding potassium permanganate to the stream at the downstream end of the treatment reach (fish barrier). Potassium permanganate would neutralize any remaining rotenone before leaving the project area. The efficacy of the neutralization would be monitored using fish (the most sensitive species to the chemical) and a hand held chlorine meter. Therefore, the potential for public exposure to rotenone treated waters is very minimal. The potential for exposure would be greatest for those government workers applying the chemical. To reduce their exposure, all CFT Legumine label mandates for personal protective equipment would be adhered to (see Comment 8a).

Cumulative Impacts: Health hazards from the proposed action would be short term and mitigated through closure of treatment areas to public and use of proper safety equipment, etc. Because rotenone in all formulations including CFT Legumine breaks down quickly and does not bioaccumulate, there should be no long-term or cumulative impacts of the application of the piscicide. FWP does not expect the proposed action to result in other actions that would increase the risk of health hazards in the streams proposed for WCT restoration. We do not foresee any other activities in the basin that would add to health impacts of the proposed action. As such there are no cumulative impacts related health hazards from the proposed treatments.

9. <u>COMMUNITY IMPACT</u> **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Alteration of the location, distribution, density, or growth rate of the human population of an area?		X				
b. Alteration of the social structure of a community?		X				
c. Alteration of the level or distribution of employment or community or personal income?		X				
d. Changes in industrial or commercial activity?		X				
e. Increased traffic hazards or effects on existing transportation facilities or patterns of movement of people and goods?			X			9e

Comment 9e. Construction traffic will increase substantially during the restoration of mining impacted areas and the construction of the fish barrier. These impacts should be limited primarily to the primitive roads that access these areas. During major construction times these roads will likely be closed to avoid potential incidents with the public and construction equipment. Some traffic will also use Highway 569 which could slow the movement of people. Fill for the fish barrier will be collected in French Gulch and transported via Highway 569 to the barrier site. Equipment used to haul the fill will likely travel at slower speeds than the posted 55 mph speed limit. However, traffic on Highway 569 is light and it is anticipated that increased truck traffic will be minimal. Further, reconstruction of Highway 569 will be occurring simultaneously with construction of the fish barrier and therefore it is possible that speed limits will already have been reduced.

10. PUBLIC SERVICES/TAXES/UTILITIES **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Will the proposed action have an effect upon or result in a need for new or altered governmental services in any of the following areas: fire or police protection, schools, parks/recreational facilities, roads or other public maintenance, water supply, sewer or septic systems, solid waste disposal, health, or other governmental services? If any, specify: ________________		X				
b. Will the proposed action have an effect upon the local or state tax base and revenues?		X				
c. Will the proposed action result in a need for new facilities or substantial alterations of any of the following utilities: electric power, natural gas, other fuel supply or distribution systems, or communications?		X				
d. Will the proposed action result in increased used of any energy source?		X				
e. Define projected revenue sources		X				
f. Define projected maintenance costs		X				

11. AESTHETICS/RECREATION **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Alteration of any scenic vista or creation of an aesthetically offensive site or effect that is open to public view?			X			11a
b. Alteration of the aesthetic character of a community or neighborhood?		X				
c. Alteration of the quality or quantity of recreational/tourism opportunities and settings? (Attach Tourism Report)			X			11c
d. Will any designated or proposed wild or scenic rivers, trails or wilderness areas be impacted? (Also see 11a, 11c)		X				

Comment 11a: Construction at the fish barrier site, the placer mining restoration and the restoration of the slopes of Sugarloaf Mountain will cause ground disturbance which will leave a foot print that some may consider offensive. The goal of the placer mining restoration and restoration of the smelter impacted slopes of Sugarloaf Mountain is to restore the landscape to the extent practicable to its historic state. While these activities will produce temporary disturbance, it is anticipated that in the long-term they will result in a landscape that appears less altered and would be more accepting to the public's view. Most of these areas are visible at least in part from Highway 569 or from secondary dirt roads. The fish barrier at the downstream end of the project area will be a permanent structure. This structure will not be visible from any roads that are open to public access. It can only be accessed by foot from upstream on the WMA or through private property on the downstream end. Because of the lack of access it is anticipated that the fish barrier will not create an aesthetically offensive site.

Comment 11c: French Creek and its tributaries are primarily located on public lands, are therefore open to public access and the area is locally renowned for its vista and scenic landscape. Recreation may be altered during this project due to construction related closures of certain areas/roads to ensure public safety and closure of areas due to the application of rotenone to the stream. These impacts are considered minor and temporary as construction activities are anticipated to be completed in 1-2 years. Treatment with rotenone should be completed in 2-3 years and closures for rotenone treatment will not likely last more than 2-5 days. Working on weekends during the treatment would also be avoided, and thus areas closed for rotenone treatment will be open during most weekends. There would be a temporary loss of angling opportunity in French Creek and its tributaries for several years after removal of non-native fish and before the reintroduced cutthroat trout and Arctic grayling become established. However, once native fish are established and reproducing, they should provide the same angling opportunities as the prior trout fisheries. It should be noted that the proposed streams are small and do not likely receive a significant amount of angling pressure relative to other more notable fisheries such as the Big Hole River. Further, there are adjacent streams and areas downstream of fish barriers whose angling opportunities will not have changed as a result of the proposed action. The streams proposed for native fish restoration should be fully colonized with WCT and Arctic grayling within 5 years of project implementation and should provide the same angling opportunity to catch wild trout as pretreatment. Currently in the Central Fishing District of Montana, which includes French Creek, the cutthroat trout limit is one fish and it is catch and release only for Arctic grayling in streams. After colonization, FWP would evaluate whether the fishery could support harvest. If appropriate, regulations would be changed to allow anglers the option of harvesting native fish for consumption from the proposed streams.

Cumulative Impacts: Impacts to recreation and aesthetics from the proposed action would be short term and minor. FWP does not expect the proposed action to result in other actions that would impact recreation/aesthetics in the streams proposed for restoration. We do not foresee any other activities in the basin that would add to impacts of the proposed action. As such there are no cumulative impacts to recreation/aesthetics from the proposed action.

12. <u>12/HISTORICAL RESOURCES</u> **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Destruction or alteration of any site, structure or object of prehistoric historic, or paleontological importance?		X				
b. Physical change that would affect unique cultural values?			X		Yes	12b
c. Effects on existing religious or sacred uses of a site or area?		X				
d. Will the project affect historic or cultural resources?			X		Yes	12b

Comment 12b: Cultural inventories of the areas proposed for restoration or construction have been conducted by GCM Services Inc. of Butte, MT. These inventories cover the proposed fish barrier site (Ferguson 2013a) and the sites proposed for placer mining restoration in French Gulch (Ferguson 2013b) and in Moose and French Creeks (Ferguson 2014). No cultural resources were identified in the area of the proposed fish barrier. Many cultural resources including prehistoric resources are present in the areas proposed for placer mining restoration. However, the vast majority of these resources are located outside of the immediate construction area. These resources include old camp sites, tent platforms, buildings, pipelines, ditches and old equipment. The proposed placer mining restoration would not affect any of these sites. The main impacted cultural resource that would be impacted by placer mining is the removal of the spoil piles of rock to establish a new stream channel and floodplain. GCM Services was consulted to review the restoration plans prepared for placer mining restoration and provide a Statement of Effects document that was submitted to the Montana State Historical Preservation Office for their review. This statement included the following: "French Creek contains extensive remains of historic period mining. These remains were combined under the site number 24DL757, which includes the combined placer mining remains of French, Moose and First Chance Creeks. The mining operations were conducted over a period of decades and represent a variety of technologies and methods. Successive mining operations overlapped preceding operations, creating indistinguishable gravel deposits and mixed artifacts within the creek channel. The proposed creek channel work in French Creek is confined to the drainage bottom. Channel reconstruction will impact elements of 24DL757 found in the flood plain such as remnants of placer and dredge tails, ditches and occasional scattered or buried artifacts, such as hydraulic mining pipeline sections, sluice boxes fragments and timbers. The drainage bottom is the least well-preserved area of the mining record of 24DL757. The creek bottom was dredged from side to side and down to bedrock, roughly seven to fifteen feet below the creek, over roughly 70 years, obscuring the historic archaeology in the drainage bottom. It is impossible to establish historic context or association for the nondescript gravel bars and ditch remnants remaining in this reach. Seasonal runoff in this high elevation drainage has washed out or filled ditches, washed away or buried artifacts and eroded placer tails. The only intact mining features in this reach of the drainage bottom are the larger dredge tails. The proposed channel work will work around these larger piles as much as possible. Roughly 20 percent of the dredge piles will be impacted by the channel work. The lower reaches of the French Creek channel restoration

project lies within areas that were dredged and then significantly impacted by the construction of Highway 569."

"The proposed undertaking will not impact structures, cabins, tent platforms, dumps, paths, roads, ditches and bench placer mining areas associated with 24DL757. These significant features lie above the drainage bottom and will not be affected. The project will not affect the upper half of the French Creek drainage, First Chance Creek or upper Moose Creek drainage, where extensive portions of the site have yet to be fully recorded. The scope of the proposed undertaking is miniscule compared to the scale of the historic mining site. In short, the integrity of the historic remains in the area of potential effect of the French Creek channel restoration lack sufficient integrity to contribute to the significance of site 24DL757. The proposed undertaking will not adversely affect site 24DL757."

The following was stated regarding French Creek and Moose Creek: "The Moose Creek stream channel restoration segment will impact placer tails that are attributed to the earliest period of prospecting in the area. These are relatively small, linear piles of sorted cobble removed and stacked by hand from the drainage bottom. Lower Moose Creek does not appear to have been mined by dredging or hydraulic means, so the devastation to the channel was significantly less than in French Creek. The loss of some of these placer tails impacts the site by removing examples of this period of mining, but does not create an adverse affect to the site. Working around these tails as much as possible is recommended. The tails in this reach have been photographed and placed in context in the survey reports. A number of similar features will remain unaffected in Moose Creek and First Chance Creek. Prehistoric cultural properties affected by the proposed undertaking include 24DL154 and 24DL796. Site 24DL154 lies at the confluence of Moose Creek and French Creek and was extensively tested and investigated in 2012 and 2014 (Ferguson 2012; 2014b) in conjunction with MDOT plans to realign Highway 569. The drainage bottom portion of 24DL154 lacks significant archaeological deposits, having been impacted by the historic mining and seasonal runoff. The 2014 investigation determined that no significant archaeological deposits are found in the drainage bottom portion of 24DL154. Site 24DL796 is a potentially significant prehistoric site located on terraces on the west side of French Creek across from the confluence of Moose Creek. The present French Creek channel defines the east boundary of the site and is actively eroding away at the terrace containing the archaeological deposits. Avoidance of these terraces was recommended. The undertaking design calls for work to approach from the east, which will avoid impacting the site. Stabilization of the cut bank terrace margins at 24DL796 is proposed. Stabilization work should approach from the east (creek) side and avoid disturbing intact portions of the terraces. In addition to stabilizing the creek channel and reducing siltation, cut bank stabilization.

The State Historical Preservation Office concurred with the findings of GCM and submitted a letter stating that the proposed project would have no effect if the stipulations recommended by GCM were implemented. These stipulations include: 1. 24DL0757 – work is confined to the drainage bottoms in the lower half of the French Creek First Chance Creek and Moose Creek drainages and placer piles are avoided as much as possible. 2. 24DL0796 – the terraces this site is located on are avoided and stabilization work approaches the site from the east. We would recommend that a monitor is present during this phase of the project. 3. 24DL0154—work is confined to the drainage bottom portion of this site (State Historic Preservation Office Letter date February 20, 2015).

13. SUMMARY EVALUATION OF SIGNIFICANCE **Will the proposed action, considered as a whole:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Have impacts that are individually limited, but cumulatively considerable? (A project or program may result in impacts on two or more separate resources which create a significant effect when considered together or in total.)			X		Yes	13a
b. Involve potential risks or adverse effects which are uncertain but extremely hazardous if they were to occur?		X				
c. Potentially conflict with the substantive requirements of any local, state, or federal law, regulation, standard or formal plan?		X				
d. Establish a precedent or likelihood that future actions with significant environmental impacts will be proposed?		X				
e. Generate substantial debate or controversy about the nature of the impacts that would be created?			X		Yes	13e
f. Is the project expected to have organized opposition or generate substantial public controversy? (Also see 13e)			X		Yes	13f
g. List any federal or state permits required.						13g

Comment 13a. The individual components of this project have relatively small individual impacts, but cumulatively the restoration efforts in the watershed are anticipated to have positive impacts on the aquatic and terrestrial resources of the drainage. French Creek and some of its tributaries are listed as impaired by MT DEQ due to sediment and metals. Restoration of mining impacts should greatly reduce sediment and metals loading to the stream and greatly improve water quality. Poor quality aquatic habitat as a result of mining also greatly impacts aquatic life in French Creek and its tributaries. Following restoration, these impacts should for the most part be eliminated. Aquatic habitat should improve and aquatic life including fish and native mussels are anticipated to respond through greater densities and more diverse communities. Native fish

restoration in the drainage will result in the largest population of WCT in the Big Hole and the second largest in Missouri River drainage that will exist in the absence of non-native fish. It will also represent the only population of Arctic grayling that will exist in Montana in the absence of non-native fish.

Comments 13e and f: The use of piscicide can generate controversy. Public outreach and information programs can inform the public on the use of pesticides and the impacts and risks associated with its use. It is not known if this project would have organized opposition. Similar projects proposed and implemented from 2011-2015 have had limited opposition. FWP tries to minimize controversy by effectively informing the public of projects, typically through scoping meetings, drafting EA's, and public meetings.

Comment 13g: The following permits would be required:

MDEQ Pesticide General Permit
MT FWP 124
MT DEQ 318
USACE 404/401
Deer Lodge County Floodplain Permit
Stormwater Discharge Permit

PART IV. OVERLAPPING AGENCY JURISDICTION

A. Name of Agency and Responsibility
   a. Montana Department of Environmental Quality – NDPES Discharge Permit for application of rotenone and temporary exemption to water quality standards for the generation of turbidity during construction (318 permit).
   b. US Forest Service, Beaverhead-Deerlodge National Forest, Wisdom and Dillon Ranger Districts for land management, including grazing management, and temporary closure of areas on Forest Service during treatment.
   c. US Army Corps of Engineers administers the Section 404 and 401 certifications.
   d. A portion of the project may occur within an area with a designated floodplain by Deer Lodge County therefore a floodplain permit may be required.
   e. Montana Fish Wildlife and Parks administers the Stream Protection Act (SPA 124) and therefore a permit would be required from this agency.

PART V. AGENCIES THAT HAVE CONTRIBUTED OR BEEN CONTACTED

A. Name of Agency

   a. Montana Department of Environmental Quality.
   b. Montana Department of Fish, Wildlife & Parks
   c. US Army Corps of Engineers
   d. Montana Natural Heritage
   e. Montana State Historical Preservation Office

f. US Forest Service, Beaverhead-Deerlodge National Forest, Wisdom and Dillon Ranger Districts
g. USDI Bureau of Land Management, Butte District Office.

PART VI. ENVIRONMENTAL IMPACT STATEMENT REQUIRED?

After considering the potential impacts of the proposed action and possible mitigation measures, FWP has determined that an Environmental Impact Statement is not warranted. The impacts of mining and native fish restoration as described in this document are minor and/or temporary and mitigation for many of the impacts is possible. The primary negative impacts as a result of this project are temporary disturbance related to construction activities and a temporary loss of fish and reduction in aquatic invertebrate abundance as a result of toxic effects of rotenone. Impacts to aquatic invertebrates have been shown to be short term (1-2 years) and minor and invertebrate communities are very resilient to disturbances such as treatment with rotenone. Further, the benefit to native WCT and Arctic grayling, both species in need of conservation, would balance the potential minor and short-term impacts to other species.

Prepared by: Jim Olsen, Fisheries Biologist Date: April 29, 2016

Submit written comments to: Montana Fish, Wildlife & Parks
c/o French Creek Watershed Restoration
1820 Meadowlark Ln.
Butte, MT 59701

Comment period is 30 days. Comments must be received by May 31, 2016 at 5:00 p.m.

PART V. REFERENCES

AFS (American Fisheries Society). 2002. Rotenone stewardship program, fish management chemicals subcommittee. www.fisheries.org/rotenone/.

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